THE

AMERICAN GAS-LIGHT JOURNAL

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Iron Buildings, Nos. 254 & 256 Canal Street, East, near Broadway, New York.

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For Engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, page 245. Address the Patentee, JOHN P. KENNEDY, Trenton, N. J.

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Samples of the above castings can be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

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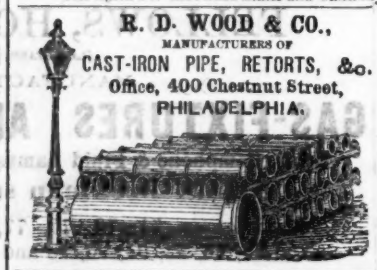

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WATER-METERS.

H. R. WORTHINGTON'S Patent Water-Meter.—This Meter combines accuracy, simplicity and remarkable durability, with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.
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WHERE GAS-WORKS AND WATER-WORKS ARE WANTED.

We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers may see where are new openings for business. And as each post master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

POST-OFFICE TOWNS IN THE UNITED STATES.

ARRANGED BY STATES AND COUNTIES,

Shewing where Gas-Works and Water-Works are Wanted

IOWA.

89 Counties, 1,074 Towns, 5 Gas-Works, No Water-Works

Adair County.

Adair, Arbor Hill, Fontanelle, Greenfield, Hebron, Holaday's.

Adams County.

Canaan City, Carl, Corning, Mount Etna, Nevinville, Queen City, Quincy.

Allemakee County.

Allemakee, Capoli, Clear Creek, Cleveland, Dorchester, Elon, French Creek, Hardin, Ion, Lansing, Lybrand, Lycurgus, Makee, New Galena, Nezeka, Ossian, Postville, Rossville, Union Prairie, Village Creek, Volney, Waterville, Wawkon, Wexford, Willson's Ford,

Appanoose County.

Beetrace, Caldwell, Centreville, Cincinnati, Hibbsville, Iconium, Jerome, Johnstown, Livingston, Memphis, Milledgeville, Moravia, Numa, Parsonville, Sharon, Unionville, Welland, Well's Mills.

Audubon County.

Exira, Hamlin Grove, Oakfield,

Benton County.

Benton City, Burk, Gomersal, Gwinville, Linwood, Pickaway, Shellsburgh, Taylor's Grove, Unity, Urbanna, *Vinton*, (c. h.) Williams, Woods.

Black Hawk County.

Barclay, Blakeville, *Cedar Falls*, (c. h.,) Cedar Valley, East Warterloo, Enterprise, Gilbertsville, Hudson, Laporte City, Lester, Mullarky's Grove, Waterloo.

Boone County.

Boonesb'ro', Carson's Point, Mineral Ridge, Prairie Hill, Rapids, River Side, Sweede Point.

Bremer County.

Breckinridge, Bremer, Frederica, Grove Hill, Horton, Janesville, Leroy, Nautrill, Polk Precinct, Spring Lake, Sumner, Waverley.

Buchanan County.

Atlanta, Brandon, Buffalo Grove, Cana, Chatham, Erie, Erin, Fairbank, Hazleton, *Independence*, (c. h.) Perry Valley, Pine, Quasqueton.

Butler County.

Algonquin, Boylin's Grove, Butler Centre, Elm Springs, Island Grove, Leoni, New Hartford, Parkersburgh, Shell Rock, Swanton, Willoughby.

Carroll County.

Carrollton.

Cass County.

Edna, Hedge's Grove, Lewis, Lura, Turkey Grove.

Cedar County.

Apollo, Cedar, Downey, Durant, Grower's Ferry, Harwell, Inland, Lowden, Massillon, Mechanicsville, Onion Grove, Pedee, Pleasant Hill, Red Oak, Rochester, Rosette, Spring Dale, *Tipton*, (c. h.) West Branch, Woodbridge.

Cerro Gordo County.

Clear Lake City, Mason City, Owen's Grove, Shell Rock Falls.

Cherokee County,

Cherokee.

Chickasaw County.

Beaver City, Bradford, Chickasaw, Deerfield, Fredericksburgh, Jacksonville, Maplesville, Nashua, New Hampton, North Washington, Stapleton, Williamstown.

Clark County.

Bartlettville, Glenn's, Hopeville, Jackson, Lacelle, La Porte, Liberty, Milford, Oceola, Ottawa, Prairie Grove, Riley, Shelby.

Clay County.

Peterson.

Clayton County.

Cass, Clayton, Community, Cox Creek, Elkader, Elkport, Farmersburgh, Garnavillo, Gem, Giard, Grand Meadow, Guttenburg, High Grove, Highland, Honey Creek, Little Port, Locust Hill, McGregor, Millville, Monona, National, New Stand, Panther Creek, Peck's Ferry, Read, Spencer, Strawberry Point, Volga City, Yankee Settlement.

Clinton County.

Boon Spring, Brookfield, Buena Vista, Burgess, Calmus, Camanche, Charlotte, Clinton, De Witt, Elk River, Elvira, Low Moor, Lyons, Orange, Spring Rock, Toronto, Welton, Wheatland.

Crawford County.

Boyer River, Denison,

Dallas County.

Adel, Alton, Boone, Chattanooga, Chicago, Greenvale, Pierce Point, Snyder, Wicotta.

Davis County.

Albany, *Bloomfield*, (c. h.,) Chequist Drakesville, Floris, Fox, Harbour, Monterey, Mount Calvary, Nottingham, Oak Spring, Pulaski, Salt Creek, Savannah, Stiles, Stringtown, Taylor, Troy, West Grove.

Decatur County.

Decatur, Franklin, Garden Grove, High Point, Leon, New Buda, Nine Eagles, Prairieville, Spring Valley,

Delaware County.

Almoral, Barryville, Campton, Coffin's Grove, Cold Water, Colony, *Delhi*, (c. h.,) Earlville, Forestville, Grove Creek, Hazel Green, Hartwick, Hoptington, Manchester, Mount Hope, Plumb Spring, Poultney, Rockville, Sand Spring, Tower Hill, Uniontown, Viola, York.

Des Moines County.

Albright's, Augusta, Burlington, Danville, Dodgev lle, Franklin Mills, Hawk Eye, Kingston, Kossuth, La Vega, Limestone, Linton, Middletown, Northfield, Parrish, Pleasant Grove, South Flint, Van Dyke, Yellow Spring

Dickenson County.

Emmet, Okoboji, Spirit Lake.

Dubuque County.

Ballyclough, Buncombe, Cascade, Cottage Hill, Derrinane, Dubuque, Durango, Dyersville, Epworth, Farley, Fillmore, Glassnevin, Jefferson, Millroy, Morena, New Vienna, Oakland, Ogden, Peosta, Pin Oak, Rock Dale, Sherrill's Mount, Tara, Tivoli, Weld's Landi g.

Fayette County.

Bethel, Breemer, Brush Creek, Clermont, Corn Hill, Douglass, Eden, El Dorado, Elgin, Illyria, Leo, Lima, Mill, Orun, Otsego, Richfield, Taylorsville, Wacuoma, Westfield, West Union, Windsor.

Floyd County.

Beelar's Grove, Flood Creek, Floyd, Howardsville, Riverton, Rockford, Rock Grove City, St. Charles City, Ulster, Watertown.

Franklin County.

Geneva, Hampton, Maysville, Otisville, Union Ridge.

Fremont County.

Austin, Buchanan, Cory, Gaston, McKissack's Grove, Manti, Plum Hollow, Sidney, Tabor.

Greene County.

New Jefferson, Rippey.

Grundy County.

Bois D'Arc, Grundy Centre, Taylor Hill.

Guthrie County.

Bear Grove, Dalmanutha, Dodge, Guthrie Cen re, Morrisburgh, Orange Grove, Penora, West Milton.

Hamilton County.

Eagletown, Homer, Lakin's Grove, Rosedale, Webster City.

Hancock County.

Elk Grove, Upper Grove.

Hardin County.

Alden, Delanti, Eldora, Fontaine, Hardin City, Iowa Falls, La Verba, Lithopolis, New Providence, Point Pleasant, Quebec.

Harrison County.

Calhoun, Howsier, Jeddo City, Little Sioux, Magnolia, Melrose, Modail, Olmstead, Woodbine, Yazoo.

Henry County.

Cotton Grove, East Grove, Hillsborough, Lowell, Marshall, Mount Pleasant, New London, Rome, Salem, Trenton, Vega, Wayne, Winfield.

Howard County.

Chester, Foreston, Howard, Howard Centre, Jamestown, Lime Spring, New Oregon, Osborne, Saratoga, Sturgis, Vernon Springs.

Ida County.

Ida.

Iowa County.

Amish, Cono, Downard, Genoa Bluff, Homestead, Jone, Koszta, Marengo, Millersburgh, North English.

Jackson County.

Andrew, (c. h.,) Bellevue, Bridgeport, Canton, Higginsport, Iron Mills, La Motte, Maquoketa, Spring Brook, Spruce Mills, Sterling, Sullivan,

Cobb, Cottonville, Emeline, Farmer's Creek, Fulton, Garry Owen, Hickory Grove, Monmouth, Mount Algor, Ozark, Rolley, Sabula, Saint Donatus, Summer Hill, Van Buren, Wagonersburgh, Waterford, Wickliffe, Zwingle.

Jasper County.

Bush, Clyde, Galesburgh, Greencastle, Lynnville, Monroe, Newton, Pleasant View, Prairie City, Vandalia.

(To be concluded.)

An Excessive Gas Bill Corrected by a Jury.

An ordinance of Councils allows the Trustees of the Gas-Works to "prepare and submit to Councils, for their approbation, rules and regulations under which the gas may be furnished to private consumers." A subsequent ordinance authorizes the Trustees to provide "from time to time, such further and other rules and regulations under which the gas may be furnished to private consumers as experience may suggest, and as the said Trustees may deem necessary or convenient in the use or consumption of gas." Whether the latter ordinance does not still require the approval of Councils to the further rules, is not quite clear, but in the absence of any repealing clause, or of any plain inconsistency, we should think that the approval required by the former ordinance was still necessary. Many of the rules and regulations in force have never, we believe, in point of fact, been submitted to or adopted by Councils. The ordinances relate to rules for the furnishing, supplying, and using of gas, and not the depriving a consumer of its use, which is a very different thing. An applicant for the use of gas has to subscribe his name to a voluminous body of terms and conditions, printed in the front part of a big book. Nobody ever reads this document, few signers see it or know of its existence, but if an unsophisticated citizen afterwards gets into a dispute with the gas office, something is sure to be fished up from this lake of darkness, and exhumed from the multifarious contents of these terms and conditions, which will generally have the effect of showing that he is in the wrong, and cannot, possibly, have any rights. One of these numerous regulations is as follows:—"Gas will be supplied by the meter, and should the meters be found defective, they will be immediately changed. And in case of their ceasing to register the quantity of gas consumed, the account will be made by the average of another meter, or by the amount charged during a previous corresponding period, at the discretion of the Trustees."

Now, if the Trustees own the meter and contract that a defective meter shall be immediately changed, but, nevertheless, allow it to remain in use, so that it does not correctly register the flow of gas, why should they be allowed to take advantage of their own neglect, and their non-compliance with their own agreement, by enforcing payment for gas not registered? Besides, if the quantity consumed is to be ascertained by a system of guessing, why is it that the consumer is not allowed to have a voice in the matter, and the guessing is confined solely to the discretion of the Trustees? Even a game of chance should have its equality and its equity. There is a charming one-sidedness in this arrangement, which may help to swell the million and a half of dollars received annually by the Trustees, but which may, at the same time, subject the citizens to a great deal of vexatious oppression. These remarks are suggested by a case occurring in the Court of Common Pleas, and reported in yesterday's *Inquirer*. The defendant's bill for the quarter ending May 12, 1860, amounted to $59.63. The bill for the previous quarter was only $4.05. The consumer refused to pay, and the city brought a suit. The evidence of the officers of the Gas-Company, tending to show the general correctness of the operation of the meters, did not strike the jury as sufficient, and they rendered a verdict only of five dollars in favor of the city, which put the costs also on the city. We know nothing of the particular facts or of the testimony, but the result establishes another precedent, if one were needed, that the Gas-Office has no arbitrary or absolute power, but must submit its claims in such cases to the adjudication of a legal tribunal. It cannot play at grab, exercise a conclusive discretion, or take the law in its own hands. The representatives of its stockholders must assert their alleged rights against citizens, just as every other individual or corporation is bound to do, according to the law of the land. Not their discretion, but the opinion of a jury, must determine the rights of the community.—*Philadelphia Inquirer, April 5.*

THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

LECTURE III.

PRODUCTS: WATER FROM THE COMBUSTION—NATURE OF WATER—A COMPOUND—HYDROGEN.

I dare say you well remember that when we parted we had just mentioned the word "products" from the candle. For when a candle burns we found we were able, by nice adjustment, to get various products from it. There was one substance which was not obtained when the candle was burning properly, which was charcoal or smoke, and there was some other substance that went upward from the flame which did not appear as smoke, but took some other form and made part of that general current which, ascending from the candle upward, becomes invisible and escapes. There were also other products to mention. You remember that in that rising current having its origin at the candle, we found that the part was condensible against a cold spoon, or against a clean plate, or any other cold thing, and part was incondensible.

We will first take the condensible part and examine it, and, strange to say, we find that that part of the product is just water—nothing but water. I last time spoke of it incidentally, merely saying that water was produced among the condensible products of the candle; but, to-day, I wish to draw your attention to water, that we may examine it carefully, especially in relation to this subject, and also with respect to its general existence on the surface of the globe.

Now, having previously arranged an experiment for the purpose of condensing water from the products of the candle, my next point will be to show you this water, and perhaps one of the best means that I can adopt for showing its presence to so many at once, is to exhibit a very visible action of water, and then to apply that test to what is collected as a drop at the bottom of that vessel. I have here a chemical substance discovered by Sir Humphrey Davy, which has a very energetic action upon water, which I shall use as a test of the presence of water. If I take a little piece of it—it is called potassium, as coming from potash—if I take a little piece of it, and throw it in that basin, you see how it shows the presence of water by lighting up and floating about, burning. I am now going to take away the candle which has been burning underneath the vessel containing ice and salt, and you see a drop of water—a condensed product of the candle—hanging from the under surface of the dish. I will show you that potassium has the same action upon it as upon the water in that basin in the experiment we have just tried. See! it takes fire and burns in just the same manner. I will take another drop upon this glass slab, and when I put the potassium on to it you see at once, from its taking fire that there is water present. Now, that water was produced by the candle. In the same manner, if I put this spirit lamp under that jar, you will soon see the latter become damp from the dew which is deposited upon it—that dew being the result of combustion; and I have no doubt you will shortly see, by the drops of water which fall upon the paper below, that there is a good deal of water produced from the combustion of the lamp. I will let it remain, and you can afterwards see how much water has been collected. So, if I take a gas lamp and put any cooling arrangement over it, I shall get water—water being likewise produced from the combustion of gas. Here, in this bottle, is a quantity of water—perfectly pure, distilled water, produced from the combustion of a gas lamp—in no point different from the water which you distill from the river, or ocean, or spring, but exactly the same thing. Water is one individual thing, it never changes. We can add to it by careful adjustment, for a little while, or we can take it apart and get other things from it; but water, as water, remains always the same, either in a solid, liquid or fluid state. Here again [holding another bottle] is some water produced by the combustion of an oil lamp. A pint of oil, when burnt fairly and properly, produces rather more than a pint of water. Here, again, is some water produced by a rather long experiment, from a wax candle. and so we can go on with almost all combustible substances, and we find that if they burn with a flame, as a candle, they produce water. You may make these experiments yourselves; the head of a poker is a very good thing to try with, and if it remains cold long enough over the candle, you may get water condensed in drops on it; or a spoon, or ladle, or any thing else may be used, provided it be clean, and can carry off the heat, and so condense the water.

And now—to go into the history of this wonderful production of water from combustibles, and by combustion—I must first of all tell you that this water may exist in different conditions, and although you may now be acquainted with all its forms, they still require us to give a little attention to them, for the present, so that we may perceive how the water, whilst it goes through its Protean changes, is entirely and absolutely the same thing, whether it is produced from a candle by combustion, or from the rivers or ocean.

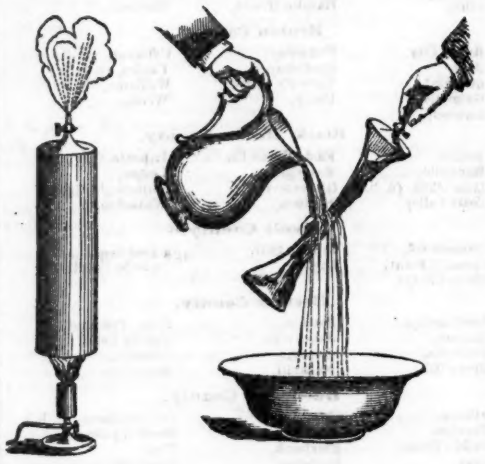
First of all, water when at the coldest is ice. Now, we philosophers—I hope that I may class you and myself together in this case—speak of water as water, whether it be in its solid, or liquid, or gaseous state—we speak of it chemically as water. Water is a thing compounded of two substances, one of which we have derived from the candle, and the other we shall find elsewhere. Water may occur as ice; and you have had most excellent opportunities lately of seeing this. Ice changes back into water; and on our last Sabbath we had a strong instance of this change by the sad catastrophe which occurred in our own house, as well as in the houses of many of you. Ice changes back into water when the temperature is raised; water also changes into steam when it is warmed enough. The water which we have here before us as ice, is in its densest state, and although it changes in weight, in condition, in form, and in many other qualities, it is still water; and whether we alter it into ice by cooling, or whether we change it into steam by heat, it increases in volume—in the one case very strangely and powerfully, and in the other case very largely, and strangely and wonderfully. For instance, I will now take this tin cylinder, and pour a little water into it, and seeing how much water I pour in, you may easily estimate for yourselves how high it will rise in the vessel; it will cover the bottom about two inches. I am now about to convert the water into steam, for the purpose of showing to you the different volumes which water occupies in its different states of water and steam.

Let us now take the case of water changing into ice; we can effect that by cooling it in a mixture of salt and pounded ice—and I shall do so to show you the expansion of water into a thing of larger bulk when it is so changed. These bottles [holding one] are made of strong cast iron, very strong and very thick—I suppose they are the third of an inch in thickness; they are very carefully filled with water so as to exclude all air, and then they are screwed down tight. We shall see that when we freeze the water in these iron vessels, they will not be able to hold the ice, and the expansion within them will break them in pieces as these [pointing to some fragments] are broken, which have been bottles of exactly the same kind. I am about to put these two bottles into that mixtare of ice and salt for the purpose of showing that when water becomes ice, it changes in volume in this extraordinary way.

In the meantime, look at the change which has taken place in the water to which we have applied heat; it is losing its fluid state. You may tell this by two or three circumstances. I have covered this glass flask—in which water is boiling—over with a watch glass. Do you see what happens? It rattles away like a valve chattering, because the steam rising from the boiling water sends the valve up and down, and forces itself out, and so makes it clatter. You can very easily perceive that that flask is quite full of steam, or else it would not force its way out. You see also that the flask contains a substance very much larger than the water, for it fills the whole of the flask over and over again, and there it is blowing away into the air; and yet you cannot observe any great change in the bulk of the water, which shows you that its change of bulk is very great when it becomes steam.

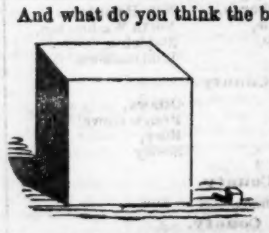
I have put our iron bottles containing water into this freezing mixture that you may see what happens. No communication will take place, you observe, between the water in the bottles and the ice in the outer vessel. But there will be a conveyance of heat from one to the other, and if we are successful—we are making our experiment in very great haste—I expect you will by-and-by, so soon as the cold has taken possession of the bottles and their contents, hear a pop on the occasion of the bursting of the one bottle or the other, and, when we come to examine the bottles, we shall find their contents masses of ice partly inclosed by the covering of iron which is too small for them, because the ice is larger in bulk than the water. You know very well that ice floats upon water; if a boy falls through a hole into the water, he tries to get on the ice again to float him up. Why does the ice float? Think of that and philosophize. Because the ice is larger than the quantity of water which can produce it, and therefore the ice weighs the lighter, and the water is the heavier.

To return now to the action of heat on water. See what a stream of vapor is issuing from this tin vessel. You observe, we must have made it quite full of steam to have it sent out in that great quantity. And now, as we can convert the water into steam by the application of heat, we convert it back into liquid water by the application of cold. And if we take a glass or any other cold thing, and hold it over this steam, see how soon it gets damp with water; it will condense it until the glass gets warm—it condenses the water now running down the sides of it. I have here another experiment to show the condensation of water from a vaporous state back into a liquid state, in the same way as the vapor, one of the products of the candle, was condensed against



the bottom of the dish and obtained in the form of water; and to show you how truly and thoroughly these changes take place, I shall take this tin flask, which is now full of steam, and I shall close the top. We shall see what takes place when we cause this water or steam to return back to the fluid state by pouring some cold water on the outside. [The lecturer poured the cold water over the vessel, when it immediately collapsed.] You see what has happened. If I had closed the stopper and still kept the heat applied to it, it would have burst the vessel; yet, when then the steam returns to water the vessel collapses, there being a vacuum produced inside by the condensation of the steam. I show you these changes for the purpose of pointing out that in all these occurrences there is nothing that changes the water into another thing; it still remains water, and so the vessel is obliged to give way and is blown inward, as in the other case, by the further application of heat, it would have been blown outward.

And what do you think the bulk of that water is when it assumes the vaporous condition? You see that cube [pointing]; it is a cubic foot. There, by its side, is a cubic inch, it is square, exactly the same shape as the cubic foot, and that bulk of water [the cubic inch] will make that bulk [the cubic foot] of steam, and the application of cold will contract that large quantity of steam into that small quantity of water. [One of the iron bottles burst at that moment.] Ah! There is one of our bottles burst, and here you see is a crack down one side, an eighth of an inch in width. [The other now exploded, sending the freezing mixture



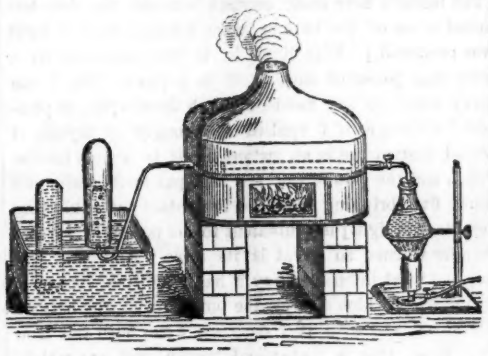
in all directions.] This other bottle is now broken; and although the iron was nearly half an inch thick, the ice has burst it asunder. These changes always take place in water; they do not require to be always produced by artificial means, we only use them here because we want to produce a small winter round that little bottle, instead of a large one. But if you go to Canada or to the north, you will find the temperature there outdoors will do the same thing as has been done here by the freezing mixture.

To return to our quiet philosophy. We shall not in future be deceived, therefore, by any changes that are produced in water. Water is the same everywhere, whether produced from the ocean or from the flame of the candle. Where, then, is this water which we get from a candle? I must anticipate a little, and tell you. It evidently comes, as to part of it, from the candle, but is it within the candle beforehand? No. It is not in the candle; and it is not in the air round about the candle which is necessary for its combustion. It is neither in one nor the other; but it comes from their conjoint action, a part from the candle, a part from the air; and this we have now to trace, so that we may understand thoroughly what is the chemical history of a candle when we have it burning on our table. How shall we get at this? I, myself, know plenty of ways, but I want *you* to get it from the association in your own minds of what I have already told you.

I think you can see a little in this way. We had just now the case of a substance which acted upon the water in the way that Sir Humphry Davy showed us, and which I am now going to recall to your minds by making an experiment upon this dish. It is a thing which we have to handle very carefully, for you see if I bring a little splash of water near this mass, it sets fire to part of it; and if I set fire to a part, and there was free access of air, it would set fire to the whole. Now, this is a metal—a beautiful and bright metal—which rapidly changes in the air, and, as you know, rapidly changes in water. I will put a piece on the water, and you see it burns beautifully, making a floating lamp, using the water in the place of air. Again, if we take a few iron filings or turnings and put them in water, we find that they likewise change. They do not change so much as this potassium does, but they change somewhat in the same way, they become rusty, and show an action upon the water, though in a different degree of intensity, to what this beautiful metal does; but they act upon the water in the same manner generally as this potassium. I want you to unite these different facts together in your minds. I have another metal here, and when we examined it with regard to the solid substance produced from combustion, we had an opportunity of seeing that it burnt; and I suppose if I take a little strip of this zinc and put it over the candle, you will see something half way, as it were, between the combustion of potassium on the water and the action of iron—you see there is a sort of combustion. It has burnt, leaving a white ash or residuum, and here also we find that that metal has a certain amount of action upon water.

By degrees, we have learned how to modify the action of these different substances, and to make them tell us what we want to know. And now, first of all, I take iron. It is a common thing in all chemical reactions, where we get any results of this kind, to find that it is increased by the action of heat; and if we want to examine minutely and carefully the action of bodies one upon another, we often have to refer to the action of heat. Now, you know, I think, that iron filings burn beautifully in the air; and I am about to show you an experiment of this kind, because it will impress upon you what I am going to say about iron in its action on water. If I take a flame, which I make hollow—you know why, because I want to get air to it and in it, and therefore I make it hollow—if I take a few iron filings, and drop them into the flame, you see, how well they burn. That combustion proceeds from the chemical action which is going on when we ignite those particles. And so we proceed to consider these different effects, and ascertain what iron will do when it meets with water. It will tell us the story so beautifully, so gradually, and regularly, that I think it will please you very much.

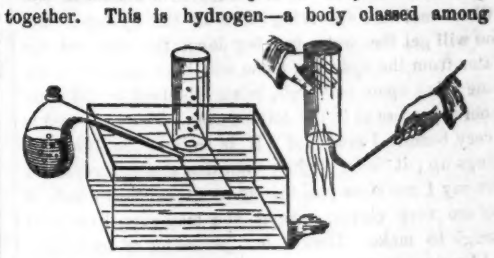
I have here a furnance with a pipe going through it like an iron gun-barrel, and I have stuffed that barrel full of bright iron turnings, and the part that is so stuffed is put into the fire and is made red hot. We can either send air through the barrel to come in contact with the iron, or else we can send steam from this little boiler at the end of the barrel. Here is a stop-cock which shuts out the steam from the barrel until we wish to admit it. There is some water in these jars, which I have colored blue so that you may see what happens. Now you know very well that any steam I might send through the barrel, if it went through into the water in the form of steam, would be condensed; for you have seen that steam cannot remain as steam if it be cooled down; you saw it here [pointing to the tin flask]



crushing itself into a small bulk, and causing the flask containing it to collapse. So that if I were to send steam through that barrel, it would be condensed—supposing the barrel were cold—it is, therefore, heated to perform the experiment I am now about to show you. I am going to send the steam through the barrel in small quantities, and you shall judge for yourselves, when you see it issue from the other end, whether it still remains steam. Steam is condensible into water, and when you lower the temperature of steam you convert it back into fluid water; but I have lowered the temperature of the gas which I have collected in this jar, by passing it through water after it has passed through the iron barrel, and still it does not change back into water. I will take another test and apply it to this gas. (I hold the jar in an inverted position, or else I should lose my substance.) If I now apply a light to the mouth of the jar, it ignites with a slight noise. That tells you that it is not steam, steam puts a fire out, it does not burn; but you saw that what I had in that jar burnt. We may obtain this substance equally from water produced from the candle flame as from any other source. When it is obtained by the action of the iron upon the aqueous vapor, it leaves the iron in a state very similar to that in which these filings were when they were burnt. It makes the iron heavier than it was before. So long as the iron remains in the tube and is heated, and is cooled again without the access of either air or water, it does not change in its weight; but after having had this current of steam passed over it, it then comes out heavier than it was before, having taken something out of the steam, and having allowed something else to pass forth, which we see here. And now, as we have another jar full, I will show you something most interesting. It is a combustible gas; and I might at once take this jar and set fire to its contents, and show you that it is combustible; but I intend to show you more, if I can. It is also a very light substance. Steam will condense; this body will rise in the air and not condense. Suppose I take another glass jar, empty of all but air; if I examine it with a taper I shall find that it contains nothing but air I will now take this jar full of the gas that I am speaking of, and deal with it as if it were a light body; I will hold both upside down, and turn the one up under the other; and that which contains or did contain the gas obtained from the steam, what does it contain now? You will find it now only contains air. But look! Here is the combustible substance [taking the other jar] which I have poured out of the one jar into the other. It still preserves its quality, condition and independence, and therefore is the more worthy of our consideration, as belonging to the products of a candle.

Now, this substance, which we have just got by the action of iron on the steam or water, we can also get by means of those other things which you have already seen act so well upon the water. If I take a piece of potassium and make the necessary arrangements, it will produce this gas; and if I take a piece of zinc, I find, when I come to examine it very carefully, that the main reason why this zinc cannot act upon the water continuously, as the other metal does, is because the result of the action of the water envelopes the zinc in a kind of protecting coat. We have learned, in consequence that if we put into our vessel only the zinc and water, they, by themselves, do not give rise to much action; and we get no result. But suppose I proceed to dissolve off this varnish—this encumbering substance—which I can do by a little acid; the moment I do that I get the zinc acting upon the water, exactly as the iron did, but at the common temperature. The acid in no way is altered, except in its combination with the oxyd of zinc, which is produced. I have now poured the acid into the glass, and you would think I was applying heat to cause this boiling up. There is something coming off from the zinc very abundantly, which is not steam. There is a jar full of it; and you will find that I have exactly the same combustible substance remaining in this vessel, when I hold it upside down, that I produced from the experiment with the iron barrel. This is what we get from water, and this is the substance which is contained in the candle.

Let us connect these two points clearly and distinctly together. This is hydrogen—a body classed among



those things which, in chemistry, we call elements, because we can get nothing else out of them. A candle is not an elementary body, because we can get carbon out of it, we can get this hydrogen out of it, or at least out of the water which it supplies. And this gas has been so named hydrogen, because it is that element which, in association with another, generates water. Mr. Anderson having now been able to get two or three jars of gas, we shall have a few experiments to make, and I want to show you the best way of making these experiments. I won't be afraid to show you, for I like you to make experiments, if you will only make them with care and attention, and the assent of those around you. As we advance in chemistry we are obliged to deal with substances that are rather injurious, if in their wrong places; the acids and heat, and combustible things we use, might do harm if used carelessly. If you want to make hydrogen, you can make it easily from bits of zinc, and sulphuric, or muriatic acid. Here is what in former times was called the "philosopher's candle. It is a little phial with a cork and a tube or pipe passing through it. And I am now putting a few little pieces of zinc into it. This little instrument I am going to apply to a useful purpose in our demonstrations, for I want to show you that you can prepare hydrogen, and make some experiments with it as you please, at your own homes. Let me here tell you why I am so careful to fill this phial nearly, and yet not quite, full. I do it because the evolved gas which, as you have seen, is very combustible, is explosive to a considerable extent when mixed with air, and might lead to harm if you were to apply a light to the end of the pipe before all the air had been swept out of the space above the water. I am now about to put in the sulphuric acid. I have used very little zinc and more sulphuric acid and water, because I want to keep it at work for some time. I, therefore, take care in this way to modify the proportions of the ingredients so that I may have a regular supply—not too quick, and not too slow. Supposing I now take a glass and put it upside down over the end of the tube, because the hydrogen is light I expect it will remain in that vessel a little while. We will now test the contents of our glass to see if there be hydrogen in it—I think I am safe in saying we have caught some [applying a light]. There it is, you see. I will now apply a light to the top of the tube. There is the hydrogen burning. There is our philosophical candle.

It is a foolish, feeble sort of a flame, you may say, but it is so hot that scarcely any common flame gives out so much heat. There is the flame, and the heat of the flame, and you see it goes on burning regularly, and I am now about to put that flame to burn under a certain arrangement, in order that we may examine its results and make use of the information which we may thereby acquire. Inasmuch as the candle produces water, and this gas comes out of the water, let us see what this gives us by the same process of combustion that the candle went through when it burnt in the atmosphere, and for that purpose I am going to put the lamp under this appa-

ratus, in order to condense whatever may arise from the combustion within it. In the course of a short time you will see moisture appearing here in the cylinder, and you will get the water running down the side, and the water from the hydrogen flame will have absolutely the same effect upon our tests, being obtained by the same general process as in the former case. This hydrogen is a very beautiful substance. It is so light that it carries things up; it is far lighter than the atmosphere, and I dare say I can show you this by an experiment which, if you are very clever, some of you may even have skill enough to make. Here is our generator of hydrogen, and here are some soap-suds. I have an India-rubber tube connected with the hydrogen generator, and at the end of the tube is a tobacco pipe. I can thus put the pipe into the suds, and blow bubbles by means of the hydrogen. You observe how the bubbles fall downward when I blow them with my warm breath; but notice the difference when I blow them with hydrogen. [The lecturer here blew bubbles with hydrogen, which rose to the roof of the theatre.] It shows you how light a thing this must be in order to carry with it not merely the ordinary soap-bubble, but the larger portion of a drop hanging to the bottom of it. I can show its lightness in a better way than this; larger bubbles than these may be so lifted up; indeed, in former times, balloons used to be filled with this gas. Mr. Anderson will fasten this tube on to our generator, and we shall have a stream of hydrogen here, with which we can charge this balloon made of collodion. I need not even to be very careful to get all the air out, for I know the power of this gas to carry it up. [Two collodion balloons were inflated and sent up, one being held by a string.] Here is another large one, made of thin membrane, which we will fill and send up; you will see they will all remain floating about until the gas escapes.

What, then are the comparative weight of these substances? I have a table here which will show you the proportion which their weights bear to each other. I have taken a pint and a cubic foot as the measures, and have placed opposite to them their respective figures. A pint measure of this hydrogen weighs three-quarters of our smallest weight, a grain, and a cubic foot weighs one-twelfth of an ounce; whereas a pint of water weighs 8,750 grains, and a cubic foot of water weighs almost 1,000 ounces. You, therefore, see what a vast difference there is between the weight of a cubic foot of water and a cubic foot of hydrogen.

Hydrogen gives rise to no substance that can become solid, either during combustion or afterward as a product of its combustion; but when it burns it produces water only, and if we take a cold glass and put it over the flame of it, it becomes damp, and you have water produced immediately in abundance; and nothing is produced by its combustion but the same water which you have seen the flame of the candle produce. It is an important point for you to consider that this hydrogen is the only thing in the world, that, by combustion, gives such a substance as this as its sole product.

And now we must endeavor to find some fresh proof of the general character and composition of this water, and for this purpose I will keep you a little longer, so that at our next meeting we may be better prepared for the subject. We have the power of arranging the zinc which you have seen acting upon the water by the assistance of an acid, in such a manner as to cause all the power to be evolved in the place where we require it. I have behind me a voltaic pile, and I am just about to show you, at the end of this lecture, its character and power, that you may see what we shall have to deal with when we next meet. I hold here the extremities of the wires, which transport the power from behind me, and which I shall use to act on the water.

We have previously seen what a power of combustion is possessed by the potassium, or the zinc, or the iron filings; but none of them possess such energy as this. [The lecturer here made contact between the two terminal wires of the battery, when a bright flash of light was produced.] This light is, in fact, produced by a forty zinc power of burning, it is a power that I can carry about in my hands, through these wires, at pleasure; although if I applied it wrongly to myself, it would destroy me in an instant, for it is a most intense thing, and the power you see here put forth, while you count five [bringing the poles in contact and exhibiting the electric light] is equivalent to the power of several thunder storms, so great is its force. And that you may see what intense energy it has, I will take the ends of the wires which convey the power from the battery behind me, and with it I dare say I can burn this iron file. Now, this is a chemical power, and one which, when we next meet, I shall apply to water, and show you what results we are able to get.

WATER-WORKS OF AMERICA.

PHILADELPHIA, PA.

We are indebted to Henry P. M. Birkinbine, Esq., the efficient Chief Engineer of the Philadelphia Water-works, for a copy of his annual report to the city councils for the year ending December, 1860. The report is quite voluminous, and embraces a large amount of interesting matter. We have space only to give a glance at the condition and operation of the works. The principal part of the water furnished to the densely populated parts of Philadelphia is drawn from the Schuylkill and Delaware rivers, the larger portion being pumped from the former stream. The operation of the different works is detailed at length in the report.

TOTAL QUANTITY OF WATER RAISED BY ALL THE WORKS.

During the year 1860 the quantity of water pumped by all the works of the department was, 7,465,740,277 gallons. At three of the works the water is raised by steam-power, and at one of the works, Fairmount, by water-power.

"Fairmount works supplied.....3,612,987,017 gallons.
Schuylkill works supplied.....2,696,960,210 "
Delaware works supplied..... 872,144,980 "
Twenty-fourth Ward works supplied 283,646,070 "

"The whole amount of water supplied during the year was equal to 27,774,420 tons, or an average per day of 75,886 tons."

Table showing the comparative cost of pumping water in 1859 and '60.

Works	Millions gallons pumped during the year 1860.	Height of Reservoir in feet.	Cost of raising the million gallons into Reservoirs in 1859, including repairs.	Cost of raising one million gallons into Reservoirs in 1860, including repairs.	Difference in cost per million gall's raised into Reservoirs in 1859 and 1860.	Saving in running expenses of 1860 over 1859.	Saving in running expenses of 1860 over 1858.
Fairmt	3,613	100	$12 33	$11 71	0 62	2,240 06	10,658 35
Schk'll	2,697	115	12 90	11 83	1 07	2,885 79	7,740 39
Del're.	872	112	23 63	23 54	0 09	78 48	8,658 96
24th W	284	230	41 66	33 17	8 49	2,410 90	5,171 64

Comparative economy of the Works in Coal, Oil and Tallow.

Works.	Average number of gallons raised one foot high per pound of coal.	Average number of pounds of coal per horse power per hour.	Average number of pounds raised one foot high by one hundred pounds of Anthracite Coal.	Average number of million gallons raised one foot high per quart of oil.	Average number of million gallons raised one foot high per pound of tallow.
Fairmount	.....	.....	.....	679	6.421
Schuylkill.	38,539	6·1	72,115,800	352	165
Delaware.	24,631	9·6	20,525,800	325	199
24th Ward	46,201	5·1	38 500,800	1,569	353
	36,457	6·9	.....	731	1,784

CONDITION AND OPERATION OF THE WORKS.

FAIRMOUNT WORKS.

The Dam.—In the low stages of the water during the past summer, when it fell below the comb of the Dam several opportunities for examining the condition of this work were presented and carefully improved. It was found that the timbers above low water line were decayed to such an extent, as to necessitate their early removal. It is advised that preparations for this work be made during the present year. The dam was built in 1819–21, and re-built, from low water up, in 1842–3. The expense of re-building was about $60,000; the present cost, with similar materials and in the same manner, on account of the advance in price of labor and material, would be about seventy-five thousand dollars. As the wood-work above water on the lower face of the dam is subject to rapid decay, requiring renewal about every twenty years, it would be a far more economical policy to re-build with more durable material. Stone work would require more than double the outlay just named, but if properly done, it would never require renewal or attention. The arrangements for re-building should be made so as to insure the commencement of the work as early as practicable in 1862; for reconstruction with masonry work, will require at least two years. The dam may be considered entirely safe for that length of time; longer than this, however, it would not be prudent to trust it, and in a matter of such paramount importance, no risk whatever should be run.

The water at the Fairmount works is pumped by eight breast wheels, driving each a sixteen-inch pump, and one turbine, driving a sixteen-inch pump.

SCHUYLKILL WORKS.

These works are now undergoing complete repair. They have rendered valuable service the past year, and have, in fact, become of the first importance. The engines are now in better condition than ever, being much more effective and reliable. The stand pipe at these works is a great annoyance during the winter season. When the cold is extreme, ice is formed in large quantities in the pipe, and partaking of the movement of the water, it oscillates with every stroke of the pump. The stand pipe not being cylindrical, but conical in shape, the ice rising with the water, is driven with great force against its sides, producing a concussion which may be heard at a great distance, and a recoil upon the machinery which is very destructive.

Measures should be taken to protect the pipe from the frost, and an alteration should be made in its shape. Slight accidents are happening to the machinery from this cause every winter, necessitating an expense of several hundred dollars for repairs. The risks of more serious injury are very great.

There are now four steam engines in these works.

Nos. 1 and 2, reciprocating over-head beam engine, 36 in. × 6 feet; pump 18 in. × 6 feet.

No. 3, reciprocating bell-crank engine, 36 in, × 6 feet; pump 21 in. × 6 feet.

No. 4, Cornish over-head beam engine, 60 in. × 10 feet; pump 30 in. × 10 feet.

Which supply the 11th, 12th, 13th, 14th, 15th and 20th Wards.

During the year, No. 1 pumped 352,302,560 gallons; No. 2, 530,115,200 gallons; No. 3, 545,362,500 gallons, and No. 4, 1,269,580,950 gallons.

COST OF RAISING WATER INTO RESERVOIR PER MILLION, GALLONS, including interest on works.....$11 83
Not including interest on cost of works..... 8 50
Cost of raising water, per million gallons, one foot high, including interest on cost of works....10 3—10 cts
Not including interest on cost of works..07 4—10 "

The economical character of the Cornish engine is clearly shown at these works, where both kinds, the reciprocating and the Cornish, are in operation side by side. The actual duty of the Cornish engine is 50,000,000lbs., raised one foot by 100lbs. of coal; while the mean duty of all the engines at these works for the year, was but 32,000,000 lbs.

DELAWARE WORKS.

These works supply the 16th, 17th, 18th, 19th and 23d Wards.

Engines.—No. 1, horizontal high pressure engine, 30 in. × 6 feet; pump 18 in. × 6 feet.

No. 2, beam condensing engine, 36 in. × 6 feet; pump 20 in. × 6 feet. Pumped by engine No. 1. 171,581,640 gallons; pumped by engine No. 2, 702,980,820 gallons.

TWENTY-FOURTH WARD WORKS.

The department have succeeded in keeping up a much more copious supply from these works, during the year, than was expected. How they may succeed the coming season, it is impossible to surmise. There is certainly a

limit to their capacity, so long as they are without a reservoir, and that limit it is believed, is passed even now. The engines have been worked to 18 strokes per minute; a velocity greater than is consistent with the safety of the machinery. Nothing less than the imperative demands of the district could have justified imposing upon them such an arduous and perilous service. As these engines are simple in construction, and of unusual strength, the repairs demanded, notwithstanding, were but slight.

The water pumped by these works supplies the Twenty-fourth Ward.

There are two Cornish bull engines; each with steam cylinder 50 in. diameter; stroke, 8 feet; pump 17 in. diameter; stroke, 8 feet.

The twenty-fourth ward works have attracted much attention from the novelty of their construction and the efficiency of their action. We annex a description of them, chiefly drawn from Mr. Birkinbine's report for 1859.

These works were erected in 1853. They are located a short distance above the Fairmount dam, on the west side of the river. The water from the river first passes through a tunnel to a chamber in which are placed three strainers. The flow of the water through this tunnel, in which at ordinary stages of the river the water is five and a half feet deep, is very slow; less than two miles per day, should two million gallons be pumped. This allows time for the heavy particles to settle to the bottom of the tunnel, which is planked and the chamber paved, so that all sediment can be removed with but little trouble; the larger and lighter particles which would float off at or near the surface are stopped by strainers. From this the water is conducted to the subsiding reservoir, which is one hundred and sixty-five feet long and seventy-five feet wide; at ordinary stages of the river, the water is sixteen and a half feet deep. In this reservoir the water deposits most of its impurities which are held in suspension and not chemically combined.

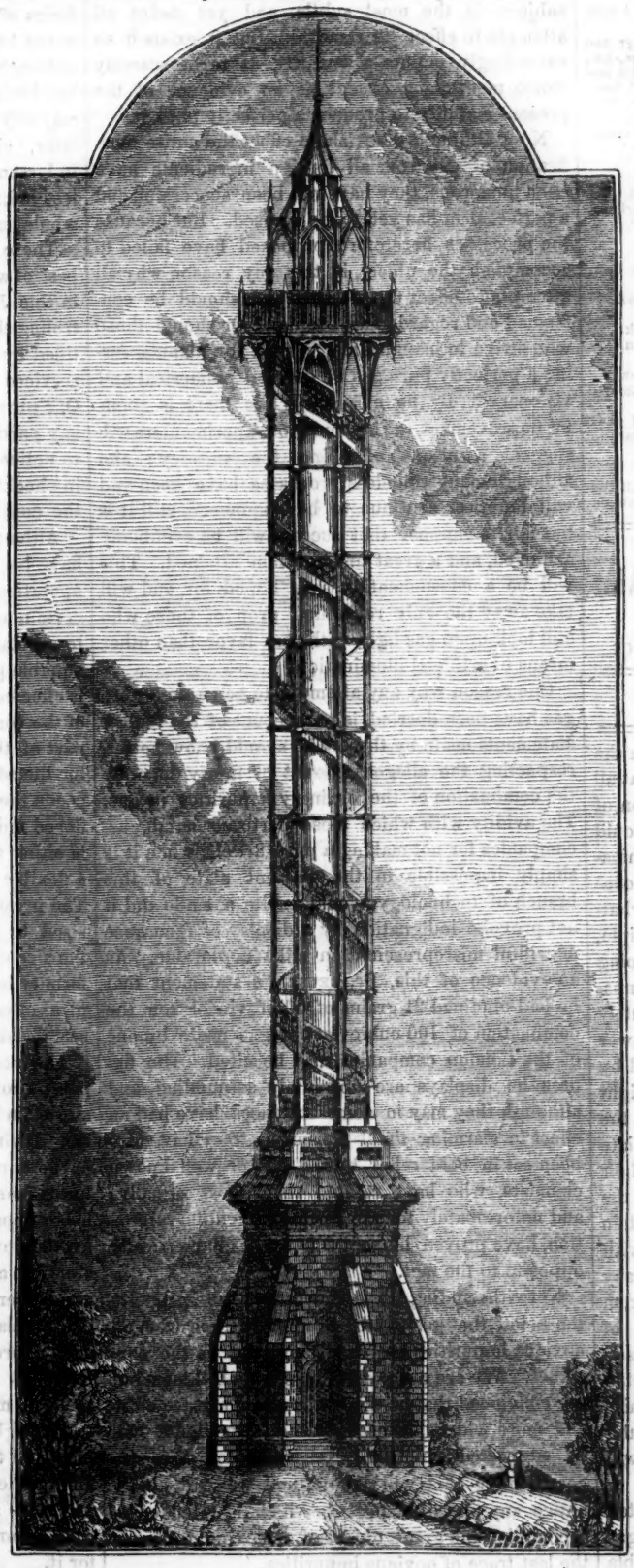
The buildings are all constructed of hard gneiss rock, found in the vicinity of the work. The masonry of the engine house and foundations of the engines, are all of large stones dressed upon both beds and faces, and are laid in hydraulic mortar to two feet above the water line, and securely bound together with iron.

The water is pumped by two direct acting vertical Cornish engines, known as the bull engine; the steam cylinder of each is fifty inches bore and the stroke of the piston eight feet. The cylinders are inverted, and placed immediately over the pumps, and the piston-rods connect immediately with the plungers of the pumps. These plungers are each seventeen inches in diameter, and same stroke as the engines, eight feet. The engines are fitted with Birkinbine's patent equilibrium governor.

There are two Cornish boilers in each boilers house, each six feet in diameter, and thirty-two feet long, with an internal flue of four feet diameter. The fire is built in this flue, and passes back through it. The heated gases are brought forward again along the exterior, each side of the boiler, and returned back under the bottom, where they are allowed to escape out of the chimney, thus making the heat travel ninety-six feet in contact with the boiler. Each boiler has two safety valves.

The stand-pipe of the twenty-fourth ward Works is quite a conspicuous object from both sides of the Schuylkill river, and from its symetrical proportions and beauty of design has attracted much attention. It is situated on high ground, about two thousand feet from the works. Its base is one hundred feet above the level of the river. The central portion of it consists of a pipe of heavy boiler plate, five feet in diameter and one hundred and thirty feet high. Around the lower part of the pipe is an octangular base of ashler work, of gneiss rock, thirty-six feet high; each angle of this base is sustained by a buttress. On the top of the stone work there is a landing enclosed by a railing, and from this landing a spiral staircase, winding around the stand-pipe, terminates in a platform one hundred and fifteen feet above the base. The upper platform is sustained by ornamental brackets, springing from the columns, which are continued above the platform, where they are connected together and to the stand-pipe by flying buttresses. This platform is surrounded by a gothic railing. The whole structure is of iron except the base, and is surmounted by a spire and flagstaff.

A sixteen inch main from the works introduces the water into the stand-pipe, near the bottom, from whence it is distributed to the district by a sixteen inch main. The water is maintained at from one hundred to one hundred and twenty-seven feet in the stand-pipe, giving a head of water in all parts of the district from one hundred and twenty to two hundred and twenty-five feet.



STAND-PIPE OF 24TH WARD WATER-WORKS.

These works are only adapted to a capacity of twenty thousand inhabitants; but with store reservoirs of larger mains, a population of seventy-five thousand could be amply supplied. At each stroke of the pump, ninety gallons are raised; at ten strokes per minute each engine will pump fifty four thousand gallons per hour. They may be worked to fourteen strokes per minute.

These works were erected by Messrs. Birkinbine & Trotter. The cost of the stand-pipe was $10,000.

GAS-LIGHT IN THE STATE PRISONS.

Some months ago we addressed a circular letter to the wardens of several of the State Prisons, enquiring if they used gas-light in the cells. A few replies only were received, and they have been reserved until a convenient moment should arrive for publishing them, which we do now in brief, as this number of the JOURNAL will be sent to the warden of every state prison in the country. They will greatly oblige us and interest our readers by letting us know whether gas is used now, or if not, what arrangements are made for lighting the cells of their prisons.

WISCONSIN STATE PRISON.

Situated at Waupun. Do not use gas. Use kerosene oil, and find that it makes a very cheap light. How *good* it is the letter saith not. A printed circular was enclosed in this letter which had been sent to various other prisons, suggesting a convention of wardens for the purpose of consulting upon means for the better management of prisons, but not a word is said about light, ventilation or cleanliness. The subject of economy, and of impressing convicts with a sense of justice and right, and at the same time to devise a system of labor that would remunerate the public for the expense of his keeping is dwelt upon.

NEW JERSEY STATE PRISON.

Situated at Trenton. Do not use gas, the prison being located without the city limits. That is no excuse, however, because mains could be easily laid to it. The legislature have been talking about it, but they have latterly been too busy tinkering up the Camden and Amboy R. R. monopoly to think of bettering the condition of convicts. They had better read "never too late to mend."

PENNSYLVANIA STATE PRISON.

Situated at Philadelphia. Do not use gas in the cells, but oil lamps. The corriders are lighted by gas.

OHIO STATE PRISON.

Situated at Columbus. The legislature of 1856 passed a law providing for lighting the cells, "so that each prisoner should have sufficient light to enable him to read from the time he is locked up till the ringing of the bell for going to bed." They were first supplied with candles, and then with lamps; but both were soon abandoned as being entirely unsuited for lighting so small a space as a cell, filling not only the cell, but the entire hall with a very offensive smoke. After trying various experiments they adopted the plan of lighting the cells with gas. They have seven hundred cells with a gas-burner in each, and have been using the gas-light for nearly three years with entire success, and with a full conviction that the gas-light is a real benefit, by promoting ventilation, and drying up the animal effluvia from the whitewashed walls. They are supplied by the city gas-works at present, at $3 per thousand feet. An effort was made Winter before last for an appropriation to build works sufficient to manufacture their own gas. The bill passed the Senate, but was not presented to the House, it is stated through the hostility of the Chairman of the "Committee on the Penitentiary," and the city gas-company's influence. Another effort was to be made this Winter, with a hope for success. The warden demonstrated that he could manufacture the gas at a cost of about $1 per thousand feet, besides the benefit of heating water for cooking purposes at a saving of near $700 in cost of wood. Should be succeed in getting an appropriation this Winter, he writes he shall want to avail of the best construction of works for that purpose, and shall probably correspond with eastern gas-companies on the subject. Besides lighting the cells, about 100 burners are used in other departments of the prison. Their "gas-bill" last year was about $2,300. The warden adds, any information on this subject will be thankfully received. We hope to present a good deal of information through the columns of this JOURNAL.

THE ELECTRIC LIGHT IN PARIS.—Two electric lamps are now placed in the Place du Carousel, kept brilliantly lighted by an electro-magnetic machine, which is itself worked by a portable steam engine of two horse-power.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month and is specially devoted to

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, and DRAINAGE everywhere.

Incidentally with these results, the business of all Gas and Steam Fitters and Plumbers; the erection of Gas-Works and Water-Works; the consumption of Coals, the manufacture and consumption of Coal-Oils, the manufacture of Gas-Pipe, Water-Pipe, Steam-Pipe, Gas Fixtures, Gas-Meters, Water-Meters, Retorts of iron and clay, and their varied apparatus; of Drain Pipes, Ventilating, Heating and Dredging Machines, will be increased immeasurably.

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New works are now springing up, however, every week, and they will continue to increase rapidly hereafter.

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THE
AMERICAN GAS-LIGHT JOURNAL.
PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.
PROPRIETOR, JOHN B. MURRAY. } { EDITOR, C. ELTON BUCK.

MONDAY, APRIL 15, 1861.

There are certain individuals connected with the gas-light interest, who seem disposed to sneer at all suggestions concerning the absolute purification of gas, and who by their actions indicate they would far rather prefer it as it is, or even more contaminated with foreign ingredients than to effect a removal of all its noxious compounds, by any process whatever. Now, simply on the old fashioned principle, that "what is worth doing at all is worth doing well," we assert that it is the duty of gas-companies to furnish gas to their consumers as absolutely pure as is possible, and to keep its illuminating power up to the highest standard. It will be admitted by all fair minded men that the consumer has a right to demand this, and to insist on its fulfilment to the letter. As a general thing, gas-engineers appreciate the necessity of using all the care within their power to effect this important end; but from the complaints we hear, originating from certain sources, some companies must be impressed with the belief that it is unnecessary to resort to any great trouble or expense to free their gas from injurious admixtures, or to exert any degree of watchfulness to maintain a high standard. This is altogether wrong, and if such a policy be persisted in, the result will be disastrous to these companies in the end, as legislative interference will undoubtedly be invoked, and litigation and bad feeling will assuredly be engendered.

Although technical chemistry has suggested many improvements in processes for producing gas as nearly pure as possible, still it is impracticable to entirely prevent a small proportion of accidental ingredients being associated with it. The amount of these impurities can, however, be reduced to such a minute quantity, as to cause no ground for apprehension as to injurious effects from their combustion, or to perceptibly deteriorate the illuminating power of the gas.

Of the impurities commonly existing in gas ammonia alone exerts any beneficial action, and this substance should exist only in a minute quantity. It would seem to be a paradoxical expression to denominate ammonia an impurity, and yet to admit that it performs a useful office if present in a small proportion in gas. Nevertheless, the experience of most engineers proves this to be the fact. Gas which has been entirely freed from ammonia, is apt to deposit naphthaline and other luminous hydro-carbons, by which its value is impaired, and besides this the deposition frequently clogs the pipes and causes much trouble.

Of all impurities in gas, bi-sulphuret of carbon—as we have before remarked while treating of this subject—is the most subtle, and yet defies all attempts to effect its removal. But it exists in so exceedingly minute a quantity, as to be scarcely worth mentioning except as an evidence of the present inability to produce a perfectly pure gas.

Now, although the trials to effect the entire purification of gas from all foreign ingredients have been numerous, they have not been successful, and a perfect plan has yet to be devised. But because the processes heretofore proposed have failed to accomplish the object, is this any reason why all attempts to effect the desired end should be contemned and regarded as Utopian? Or should those who strive to inaugurate a system for manufacturing a perfectly pure gas be deemed chimerical and visionary? By no means. While there is room for improvement, the ingenuity of experimenters will suggest a means of filling the vacancy; and although many valueless processes have been and will doubtless continue to be announced, still it is but fair to suppose that success will be eventually achieved, and a great amelioration attained. This will be a consummation long hoped for, and will take away the only remaining prop of those who still look upon gas-light with less favor than other means of artificial illumination.

One reason why any attempts to generate a pure gas have been decried, is on account of the foolish statements made by those who should know better, respecting the alleged amount of injury done by the combustion of the ordinary impurities in gas. The avidity with which these partizans assail gas-companies for not making a pure article, when it is simply impossible in the present state of this branch of technology, would excite a smile did it not provoke indignation by a display of ignorance or willful misrepresentation alike deplorable. As an evidence of this, Dr. LETHEBY's statement that he had obtained 21 grains of oil of vitriol from the combustion of 100 cubic feet of gas made by one of the London companies, may be cited. The figures he displays are absolutely astounding, and although they may in some instances have had an effect in alarming timid consumers, they have also been set in bold relief by the data of well known chemists, who have refuted them most signally; and unfortunately for the Doctor's scientific reputation, have proved his opinion to be diametrically opposite to the fact.

Notwithstanding these differences, we incline to the belief that gas will be eventually freed from all noxious impurities ere it is delivered to the consumer. We are not perfectionists in all things, but are convinced that as the truths of science are more and more widely diffused, certain expedients will be suggested which will be available. We sincerely hope this will follow, and we will gladly notice any plausible process which is intended to accomplish the great object of removing from gas the last trace of noxious impurities.

GAS-REGULATORS.

The enterprising character of inventors has placed within the reach of both producers and consumers of gas, a number of improved forms of apparatus, whose value and importance have been fully demonstrated. Notwithstanding this, the parties for whom these improvements were designed, evince in many instances, a tardy disposition to avail themselves of the benefits which are said to attend their employment. In speaking of clay-retorts, photometers, and exhausters, we noticed how backward many gas-companies were in introducing them; and a number of other cases might be adduced in evidence of this exhibition of a "penny wise, pound foolish" policy, which, in the present age, should be vehemently reprehended. Consumers, too, would profit by seeking practical information respecting the apparatus designed for their especial use, and by adopting new instruments of real value, economy would, in many instances, be largely promoted. Conspicuous among the forms of apparatus for which economical considerations have been urged, is the gas-regulator; and although within the past few years a large increase has been observed in the number used, yet a great majority of consumers have not adopted the regulator, either not being satisfied of its efficacy in lessening the amount of gas-bills, or from a careless indifference, or perhaps from ignorance of the whole subject.

There are many gas-regulators in the market, the best of which have been at different times advertised in this JOURNAL, and their power of properly controling the consumption of gas has been duly certified by the eminent chemists whose professional services were invoked by the owners or agents. Our purpose, however, is not to call attention to any particular form of this instrument; but simply to notice the principle of its action, and its agency in checking an undue pressure in the premises of the consumer.

Although various modifications of the regulator have been devised and patented, their principle of operation is essentially the same, viz: to offer a certain amount of obstruction to the flow of gas, or to regulate it in such a manner as to maintain an equable pressure in all parts of the building. This is effected by the gas which enters the service-pipe of the consumer, exerting a pressure on the movable part of the appartus, which contracts the passage for the admission of the gas, when the pressure exceeds the desired amount, and thus its flow is rendered uniform. The movable part of the regulator is either a small gas-holder sealed with mercury, or a flexible diaphragm, to which a valve is attached. The pressure of the gas, when greater than is desired to be used, raises the valve and diminishes the size of the opening for the gas, and thus, a uniformity is attained, the result of which is a far pleasanter and more steady light, as well as the no less desideratum, a reduced bill.

The necessity for regulators is particularly apparent in large buildings, especially those several stories in height, such as factories, theatres, hotels, &c. Owing to the diminished atmospheric pressure in the upper parts of such edifices, the gas always burns more freely in the highest stories than on the lower floors. Therefore, in order to perfectly equalize the flow, a regulator should be attached to each story, so adjusted as to overcome this difference of atmospheric pressure; but in most instances, one regulator suffices, and its beneficial effects are soon appreciated in the marked economy which it induces. Although the importance of this instrument is more positively shown in large buildings, yet it ought to be extensively used in stores, dwellings, and the like. The saving which it effects is an argument appealing directly to every consumer, and it is a matter of surprise that this being the case, a more extended demand has not been created for it.

We think gas-companies would find it to their interest to recommend the regulator to their consumers, as it would doubtless tend to remove a ground of much complaint on account of fancied overcharges, false measurement, &c., which are now so frequent. The subject is an important one and deserves a liberal share of attention, and we hope consumers of gas will awaken to the value of the regulator, which, as tending to cheapen light, claims no small share of consideration.

WATER-METERS.

The report of the Cochituate Water Works at Boston, Mass., bears testimony to the necessity of meters in ascertaining and regulating the supply of water. A marked increase in the revenue from sources hitherto insignificant is the result of their use, and the accuracy of the meters of Worthington's manufacture is especially noticed. Within a few days, the Committee of the Boston Water Board visited this city, and ordered some twenty-five additional meters from Mr. Worthington.

The bill now before the Legislature of this State authorizing the Croton Aqueduct Department to purchase materials without advertising, is understood to apply in part to the acquisition of meters, the absolute necessity for which is becoming daily more and more apparent.

CORRESPONDENCE.

WALTON'S ANTI-FREEZER.

SING SING N. Y. GAS-WORKS, March 15th, 1860.

DEAR SIR:—We have had this past Winter, a great deal of trouble with the mains freezing up in some of the streets, in consequence of the latter being cut down, and the ground full of springs, so that as fast as we thawed them out, they would freeze up again. We thought of taking them up and putting them down deeper; but I saw Walton's "Anti-Freezer" at the office of the GAS-LIGHT JOURNAL, and thought perhaps we could use that, and it would answer as well as to take up the pipes. What I wish to know is whether the "Anti-Freezer" will keep the pipe free from frost, as there is a great deal of water running through them, and some of them are not over twenty inches deep, but have quite a descending grade. We have also a number of lamp-posts stopped in different parts of the town in consequence of being frozen.

Please inform me what your opinion is in regard to our pipes, and whether the "Anti-Freezer will remedy what I have written above.

Yours truly,

W. H. BARLOW,

Supt. Gas-Works, Sing Sing, N. Y.

[In reply to the above we would say that Mr. Barlow's experience of freezing in his mains, is that of dozens of other gas-works at the north and east. That Walton's Anti-Freezer will protect them we are quite satisfied, and the certificates on page 208 of this volume should be a sufficient guarantee to any gas-works to try it. On page 210 are the engraving and description of the apparatus which costs but $5 to $10, together with prices for Rights to the various gas-works; and they are low enough in all conscience, but some enterprising superintendents, unwilling to pay Mr. Walton a reasonable compensation for the use of his invention, have offered to *purchase the apparatus* alone. As we have said before, after losing a few thousand dollars more, the northern gas-works will be glad to adopt Mr. Walton's excellent improvement.—ED.]

To the Benevolent and Humane.

An old man, 74 years of age, named JOSEPH WAKEMAN, residing in London, who has been for about 30 years employed in various London gas companies in the capacity of inspector, surveyor of mains and collector, has lost the use of his eyes by cataract, and must undergo a critical surgical operation, to prepare for which he will have to incur an expense totally beyond his means.

The editor of the London Journal of Gas-Lighting is acquainted with the particulars of his case, and we now ask the American and Canadian officers, engineers and others connected with gas-works to send their mite for this afflicted old man. We will receive and forward subscriptions, all of which will be acknowledged in our columns, as they come in.

Subscriptions should indicate the name and address of the giver, and be carefully sealed and addressed to the AMERICAN GAS-LIGHT JOURNAL, New York city.

NEW PRESIDENT OF THE N. Y. GAS-LIGHT COMPANY. Mr. John H. Adam is the gentleman who has been elected to fill the chair vacated by the late Wm. W. Fox. Mr. Adam is a respectable lawyer of this city, an eastern man by birth we believe, and although not prominently known here, occupies now a very prominent position, which he will fill no doubt to the entire satisfaction of those over whose interests he has been elected to preside.

ON THE LOSS OF LIGHT BY GLASS SHADES.

To the Editor of Silliman's American Journal of Science and Arts:

SIR:—In the November number of your Journal I find a notice of my experiments on the loss of light by glass shades, with an account of additional investigations by Mr. Frank H. Storer; his communication induces me to offer some further remarks on the subject.

The experiments were intended to be of a practical nature, and were tried solely in order to ascertain (as I state in my letter to the London *Journal of Gas-Lighting*) the loss of light occasioned by the use of the ordinary glass shades. It is not, therefore, quite correct for Mr. Storer to compare results obtained by the use of *flat sheets*, with the loss of light occasioned by *spherical shades*. He is right, however, in supposing that by "the loss of light," I intended to express "the actual diminution of the amount of light, falling, for example, upon the pages of a book held near to its source, which would be occasioned by the interposition of the shades enumerated."

Prof. Verver had another object in view, and his experiments do not apply to this subject. *He* was investigating the illuminating power of gas when burnt in an Argand burner with, and without a chimney. The gas in these two cases is burnt under two very different conditions, while in Mr. Storer's experiments, and those which I have tried, the gas was burnt under precisely the same circumstances whether a shade was interposed or not, the only difference being in the substance through which the light was transmitted.

I conducted my experiments in the following manner:—In order to avoid the trouble and inaccuracy arising from the use of a candle, I employed a gas-light as the standard of comparison throughout the trials of all the shades. This could easily be done, as in the blackened experiment chamber of the Liverpool United Gas-Light Co., there is a duplicate set of apparatus, two governors, meters, burners, &c., being fixed at opposite sides of the room.

The lights (which we may call A and B; having been made equal, and their respective consumptions noticed, the first shade (that of clear glass) was placed surrounding A, and the photometer screen moved towards it, until both sides of the screen were equally illuminated, the reading on the photometer staff was then found to be 1·118 on that side of the centre of the staff nearest A, or, in other words, the proportion of light given by B (without a shade), was to the light given by A (with a shade), as 1 to $\frac{1}{1\cdot118}$ or as 1 to 0·8944, or the loss of light by the use of the shade was equal to 10·56 per cent. The first shade was then removed, and the next substituted, and so on till the loss of light in each case was determined.

After all the shades had been examined, the lights were again compared, and found to be equal as at first adjusted. The quality of the gas and the descriptions of burner employed do not affect the question, provided that the same burner is used throughout all the experiments. The burners I used were "No. 3, Fish-tails," consuming 3·7 cubic feet per hour. The gas was taken from the street mains.

By using a standard light of unvarying intensity, all the errors likely to arise from inequalities in the consumption of a candle are avoided, and much time is saved in making the experiments, as one or two observations with the photometer in each case are quite sufficient to insure accuracy.

The divisions on the photometer staff do not necessarily represent candles, but the proportion that one light under examination bears to the other, when one of them is taken as unity.

I may observe that the single experiment made with a *sheet* of common window glass was tried simply to confirm the result obtained by the globe of clear glass.

The distance at which the glass is placed from the light does not seem in the slightest degree to affect the amount of light transmitted through it. I am glad to find that my own experiments on this point are so entirely confirmed by Mr. Storer's statement.

WILLIAM KING.

Liverpool United Gas-Light Co., Dec., 28, 1860.

NOTE BY MR. STORER.

In reply to the courteous letter of Mr. King, I must express my regret that he has not more explicitly stated the reasons which lead him to object to a comparison of results obtained by the use of flat sheets of glass, with those obtained when spherical shades are employed. The light which is reflected back from the interior surface of one side of a lamp shade, of any form, would be compensated for by that similarly reflected from the opposite side—and that no similar compensation could occur in my own experiments where only single sheets of glass were used,—is evident; but I am ignorant of any experiments which go to show that the amount of light which is cut off from a given surface by the interposition of a *flat* screen, is different from that which would be stopped by a *curved* screen *of the same material*. Let us suppose a precise example; in a large sheet of blackened tin we cut out an aperture, say three or four inches diameter, and cement therein a flat sheet of ground glass, and, having interposed the apparatus between a flame and the photometer, determine how much light is cut off by the glass, *i. e.*, bring the photometer to rest, as it were:—if now, having done this, we remove the flat sheet of glass, and fasten in its place a segment of a lamp-shade of a material identically similar with that of the flat sheet first used, shall we find that our photometer is no longer in equilibrium? The same amount of light must have in each instance passed into the aperature in the sheet of tin; why should it not be transmitted to our photometer in the same way in either case? The experiment cited would probably be difficult to carry out in practice, since it would not be easy to find curved and flat screens of ground glass of precisely the same material, or ground equally rough. I state it merely in order that the conditions of the problem may be clearly understood, and with the desire that some proof may be given that the transmitted light would be less in one case than in the other,—a supposition not in accordance with received theories (see Art. Light in Encyclopædia Metropolitana, p. 347, §§ 42, 43); nor would it be inferred from what is known of the analogous cast of radiant heat, (see LAME, *Bours de Physique de l'Ecole Polytechnique*, 2de Edit. Paris, 1840, i, 309).

On the other hand, looking at the question in its practical bearing, it is clear that all lamp shades are not spherical. Witness, for example, the flat sheets of colored or ground glass used by the cars upon our street railways, the flat sheets of plain glass of the street gas lanterns, and the flat sheets of ground, enameled, or colored glass in the out-of-door lanterns of eating-houses, &c.; to say nothing of the shades constructed of flat porcelain transparencies which are so commonly employed in this country to soften the glare of gas-lights; or of the lanterns of colored and enameled glass which were so often exhibited in the torch-light processions of the Presidential campaign of the Autumn of 1860, and by which the phenomenon, of "loss of light by glass shades," now under discussion, was so strikingly exhibited. In instituting a new series of observations, I, therefore, chose to make experiments, the results of which might be added to those of Mr. King, rather than to repeat the work which he had already so faithfully performed. In publishing my results, I regarded them as being merely supplementary to those of Mr. King, neither intending to institute any comparison between the two series of observations, nor directly to compare his spherical shades with my flat sheets. I intended to state only that my own experiments corroborated those of Mr. King, in so far as they went to prove the *great loss of light* occasioned by the use of glass screens.

As for the experiment of Prof. Verver, to which Mr. King takes exception, he must pardon me if I persist in maintaining that the observation does apply to the question at hand. It matters little in science, at any time, what *object* an experimenter may have in view, so long as the truth is attained and exhibited by his researches; but in the case in point, Verver's experiment, so far as it goes, applies directly to our subject. (See his own words, this Journal, Nov., 1860, [2.] XXX, 421.) Since, as I remarked in my previous note, the gas was indeed burned under somewhat different conditions in the two stages of Verver's emperiment, his result must consequently be regarded as merely approximative; but before seeking to discard it altogether, Mr. King should have remembered that a globular glass shade surrounding a fish-tail burner is in some measure a *chimney* and that, therefore, his own results cannot well be *entirely* exempt from the same source of error which effects the experiment of Verver. In making this remark, I would not in the least degree imply that Mr. King's observations are not most excellent. For my own part, I entertain no doubt of their accuracy;—for, throwing out the conceivable slight error to which I have alluded, his method of experimenting is unquestionably the best which is yet known. I urge only that the observation of Verver, must not be rejected.

FRANK H. STORER.

Boston, Feb. 6, 1861.

AM. JOUR. SCI.—SECOND SERIES, VOL. XXXI. No. 92—MARCH, 1861.—*Silliman's Journal.*

THE ARTESIAN WELL AT COLUMBUS, OHIO—This well having reached a depth of 2,775 4-10 feet, and no water being obtained, the work on it has been suspended. A current of water was struck at 150 feet, sulphur water at 180, and salt water at 675 feet; but none of this water rose to the surface. Dr. Newberry, who has made a geological examination of the materials brought up by the borings, gives a discouraging report in regard to the prospect of finding water by a continuation of the work. The temperature of the well at 2,475 feet, was found to be 88 degrees Fahrenheit, showing an increase of temperature of one degree for every seventy-one feet.

FORMS OF BILLS FOR GAS, ADOPTED BY THE NEW YORK CITY GAS-LIGHT COMPANIES.

In conformity to requests from country Gas-Light Companies for the most approved forms of Bills for Gas, we print those adopted by the New York City Companies.

Form of Manhattan Gas-Light Company's Bills.

(On the reverse side of the Bill.)

Office, IRVING PLACE, cor. E. 15th Street.

New York,

M

To The Manhattan Gas Light Company, Dr.

For Gas consumed

From *to*

Index *to* —

Cubic Feet, at 25c.

Rent of Meter,

Rent of Fixtures,

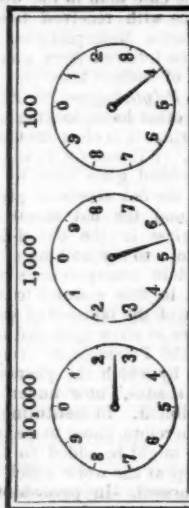
$

Received payment,

For the Company,

☞ For Rules, see back of this Bill.

Office hours from 8 A. M., to 6 P. M.



CUSTOMERS WILL PLEASE OBSERVE THE FOLLOWING RULES:

To make application at the office for the use of the Gas before lighting it, and give notice when they intend to remove or cease burning, thereby avoiding all liability for Gas consumed by other parties.

To protect their Meter and Service-Pipe from frost.

To pay the Gas Bills promptly, as a *condition of supply.*

To send the amount of the bill to the office, if not paid to the Collector on presentation.

Customers can easily ascertain the quantity of Gas consumed, by the indexes on the Meter. The dial on the right indicates hundreds, the centre thousands, the left ten thousands. Thus, if the 100 hand is at 4, the 1,000 between 5 and 6, and the 10,000 between 2 and 3, the index is read 25,400. Deduct the last index on the bill rendered from the present index, and you have the quantity consumed.

N. B. To guard against impostors, each Inspector is provided with a certificate, signed by the Vice President or Secretary. His duty is to attend to the Meter only; and he is expressly forbidden to demand or accept any compensation for services, or collect any bill due the Company.

Preserve this Bill for your own security.

Francis & Loutrel, Printers, 45 Maiden Lane, N. Y.

Form of the New York Gas-Light Company's Bills.

(On the reverse side of the Bill.)

Punctual Payment of the Gas Bills is required to be made, as a condition of Supply.

☞ Consumers of Gas, who intend to remove or discontinue its use, are particularly required to notify the Company thereof, at the Office, or they will be held liable for all subsequent supply; and also, all new occupants of places already fitted up, are required to give written Notice at the Office of the Company, otherwise they will be held liable for all back dues.

New York, February 186

To THE NEW-YORK GAS LIGHT COMPANY, Dr.

Index,

From *to date, To*

Cubic feet of Gas, at 25 cents,

Months, { *Rent of Meter,* / *Rent of Fixtures,*

$	c.

Received Payment for the Company, 186

It is requested that the amount of the Bill be promptly sent to this Office, if not paid to the Collector when rendered.

OFFICE, 174 CENTRE STREET,
Company's Works, 21st and 22d Streets, 1st Ave. to East River.

Explanation of the Meter, Indexes, &c.

The outer case of the Wet Meter has inclosed in it a cylinder or Drum, divided into four compartments, each holding a certain proportion of a cubic foot. The revolution of the Drum on its axis when the Gas is turned on, gives the motion to the wheel-work of the Index, according to the number of cubic feet delivered. In the Dry Meter, the measurement is effected by compartments having flexible joints, by whose motion the quantity delivered is shown on the Index.

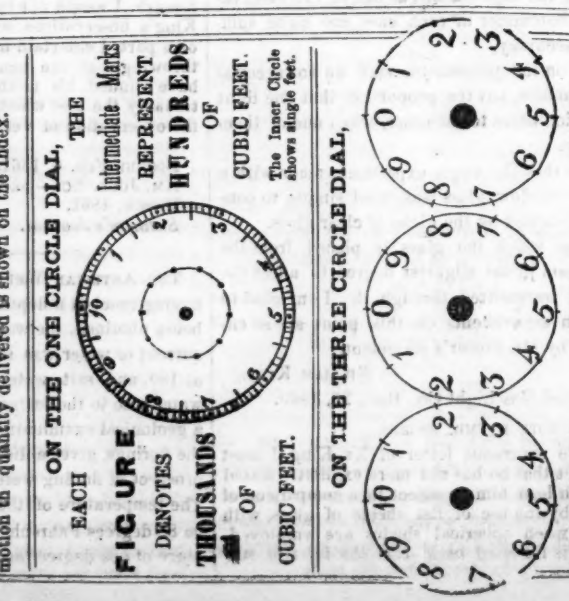
ON THE ONE CIRCLE DIAL,

EACH **FIGURE** DENOTES **THOUSANDS** OF CUBIC FEET.

THE Intermediate Marks REPRESENT **HUNDREDS** OF CUBIC FEET.

The Inner Circle shows single feet.

ON THE THREE CIRCLE DIAL,



HUNDREDS.	TENS.	UNITS.
Each figure shows 10,000 feet.	Each figure shows 1,000 feet.	Each figure shows 100 feet.

Deduct the index of the former inspection from the present index, and the difference is the quantity which has been supplied in the intermediate time.

In order to fill the Wet Meter properly, to remedy defic ency of light, the main-cock should be turned off, the top. side, and bottom screws taken out, and the liquid gently poured in until it drips at the side opening; the screws being then securely replaced, and the cock turned on, a full supply will be obtained in a few seconds. Care must be taken not to bring a light near the Meter.

In Cold Weather, the Meter and Service Pipe should be protected by suitable covering from the action of the frost and thus the inconvenience of the light going out from that cause will be prevented. The Inspectors are instructed to substitute alcohol for water in the Meters, when furnished with the article by and at the expense of the consumer. The ordinary kind of Whisky will answer the purpose.

When a smell of Gas is perceived, no light must be taken near the place where the escape is, especially if the situation be confined. Notice should be sent to the Company. Free ventilation should be resorted to, and, as an additional precaution, the stop-cock at the Meter should be shut.

THE THIRD AND LAST CALL.

The bills are left at the residents of the Company, monthly; a second call is made for the cash, when, if not forthcoming, the following laconic notice is addressed to the delinquent. The compiler of this interesting communication, must have taken a leaf from Chesterfield's "Forms for letter writers." It may not be amiss to add that we received the notice, of which we subjoin a copy, by reason of our shortcomings lately; otherwise it is probable we might not have known of the existence of such a document. If it is not heeded the unlucky consumer is plunged into outer and inner darkness, without the benefit of clergy:

OFFICE OF THE NEW YORK GAS-LIGHT COMPANY,
No. 174 Centre Street.

New York, 1861.

Sir:—Your bill from this Company for premises No. St., amounting to $ remains due.

The terms of supply require that the accounts shall be *punctually* paid, or the light discontinued.

Your prompt attention at the Office, to this rule, will avoid the necessity of its enforcement, and oblige,

Respectfully,
C. L. EVERITT, *Secretary.*

The following form is rather more courteous and perhaps no less efficient. Gas companies elsewhere can now take their chances. We would suggest that both forms might be found serviceable, according to the temper, habits, and social position of the consumer; but the N. Y. Gas-Company does not seem to think so, as it treats all alike:

OFFICE OF THE MANHATTAN GAS-LIGHT COMPANY,
Corner of Irving Place and 15th st.

New York, 1861.

Mr. ——:

Dear Sir,

Your bill for gas, for the month of amounting to $ remains unpaid.

Please send the amount to this office, on or before the and oblige,

Your obedient servant,
FLOYD SMITH,
Vice President.

We have other forms for the several departments of gas-works, which we will print in an early number.

GAS BILLS FOR TEN YEARS.

As the subject of the steady increase of bills for gas-light has agitated the country lately, we present the bills of a small private family in this city, for ten consecutive years, showing a steady increase in the expense, while the number of persons in the family remained the same precisely; the most marked increase dating from the time when the price of gas was reduced from $3 to $2 50.

	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.
Jan,..	.....	.....	.....	.....	.....	.....	9 25	8 50	10 00	9 25
Feb ..	.....	.....	.....	.....	.....	.....	9 75	10 75	9 25	11 75
March	12 75	13 80	17 70	22 80	24 00	26 04	5 75	7 00	7 00	7 50
April.	.....	.....	.....	.....	.....	.....	7 00	6 00	6 00	6 25
May..	.....	*9 00	.....	.....	.....	.....	6 50	5 50	5 00	6 25
June..	11 20	.....	10 20	13 20	14 10	15 00	3 25	4 75	4 25	3 25
July..	.....	.....	.....	.....	.....	.....	8 00	1 75	2 50	2 50
Aug..	.....	.....	.....	.....	.....	.....	2 25	2 25	3 00	2 50
Sept..	6 30	.....	7 50	9 60	7 80	10 20	3 75	4 25	4 25	5 50
Oct...	.....	.....	.....	.....	.....	†6 00	5 75	8 00	8 00	9 50
Nov..	.....	.....	.....	.....	.....	9 00	9 50	10 75	10 00	11 00
Dec. .	16 80	18 35	15 30	22 80	24 60	7 50	7 75	10 75	9 50	11 25
Totals.	47 05	41 15	50 70	68 40	70 50	73 74	73 50	80 25	78 75	86 50

* The family were in Europe, from May 1 to Nov. 1, 1852.

† The price of gas per M. c. f. was $3, until October 1, 1856, when it was reduced to $2 50.

If a list of fifty gas bills were presented, it would, probably, not be a fairer example than the above, for the reason that the size of the family and their general mode of life has been unchanged. The steady increase in the yearly cost of gas shows, first, that the reduction of price is, for some reason or other, no saving to the consumer; and secondly, that the use of gas requires a steadily increased amount of it to meet the requirements of the eye.

Another fact worthy of mention, is, that since January 1, 1860, the gas has been shut off at the meter during the day, to prevent loss by leakage in the house-fittings, but no gaining appears to have resulted from this precaution.

THE MANHATTAN GAS-LIGHT CO.—The Manhattan Gas-Light Company of New York city, is now the fourth gas company in the world, in point of magnitude of its operations,—the Paris, France, Gas Company, and the Imperial and Chartered Companies of London, being the only ones which precede it.

ANSWERS TO CORRESPONDENTS.

J. G. D. of Maine,—*A mixture of atmospheric air with olefiant gas, is much more explosive and detonates with far greater violence than when pure hydrogen and atmospheric air are mingled together. Consequently in analyses of gases rich in olefiant gas, great care is necessary in firing the mixture, or serious consequences may ensue.*

A. L. D. of Mass.—*The average pressure in most level cities is from* 1.3 *to* 1.5 *inches. It seldom exceeds this, unless the situation of the city should be uneven.*

P. J. of N. Y.—*We are quite at a loss to comprehend your letter. You may think you put your arguments logically, but you fail utterly to convince us. Your peroration would undoubtedly puzzle the brains of even a Philadelphia lawyer.*

S. C. J. of N. J.—*We have heard no complaints whatever, of the gas lights or anything connected with them, on railroads where they have been adopted. On the contrary, they impress all with a favorable opinion, and where the apparatus is of the right kind, no danger need be apprehended.*

L. R. F. of Md.—*We have never heard of a well authenticated account of pure coal-oil exploding while being burned. We believe it to be perfectly safe. In another column you will find an account of an explosion of a so-called kerosene oil. This was undoubtedly due to the dishonest admixture of burning fluid with the coal-oil, and the scoundrel who perpetrated the fraud should receive his deserts by serving a long period in the penetentiary.*

J. S. T. D. of Va.—*Oxide of iron, mixed with chloride of calcium or sulphate of lime, has been patented in England for effecting the absorbtion of sulphuretted hydrogen and ammonia at the same time. We believe Mr. Laming was the patentee of this invention. It is very little used, as lime alone continues to be the main dependence in the purifying house.*

F. G. C. of Tenn.—*The common pit candle used by the miners in England, average* 30 *to the pound, and it requires two of them to give a light equal to a standard wax candle.*

C. E. M. of Mo.—*We have already noticed on page* 170 *the abolition of meter rents by the Manhattan, New York and Harlem Gas-Light Companies of this city. It took effect on February* 1*st of this year.*

L. E. T. of Ark.—*From your description we should think your town fully capable of supporting gas-works. In England many small villages of only a few hundred inhabitants have their gas-works, and they pay well in most instances when properly managed.*

E. T. S. of Cal.—*Write further particulars and we will inform you. At present we cannot venture an opinion.*

A. E. of Wis.—*You will find our opinion expressed at some length on page* 204 *of this volume.*

ADVERTISING.—There are few people who understand the law of advertising. The few who do understand it invariably succeed and amass fortunes. There is not a solitary exception to this rule. The law of advertising, clearly understood and obeyed, enables the advertiser to realize the abounding truth there is in one of the proverbs of Solomon: "There is that scattereth and yet increaseth." And he who misunderstands the law of advertising, or fails to give obedience to it, will surely realize the other half of the same proverb: "There is that withholdeth more than is meet, but it tendeth to poverty." Advertising to be successful as a means of business, should not be spasmodic and intermittent, but continuous. Persevered in, it always yields reward. There is no such word as fail to the persistent advertiser. And he who expects results from a single advertisement, which has had but two or three insertions and is then withdrawn, is no more reasonable than a man would be to expect favorable results from taking his shutters down three days in a month, and keeping the shutters closed the remainder of the time; or than the man who shrouds his sign of business except on particular days and at long intervals of time.—*Boston Courier.*

[The above paragraph is full of good sense. A persistent advertiser is sure to induce people to buy his wares, on the same principle that a woman often marries a peristent suitor, to get rid of his importunities.]

GAS FOR THE BRITISH NAVY.—The result of the experiments now being made by order of the Board of Admiralty at the steam factory at Woolwich dockyard, England, for the purpose of testing the availability of Major Fitzmaurice's contrivance for supplying the ships of her Majesty's fleet with gas, will be to secure the application of gas on shipboard in all cases. The gas could be manufactured in the engine or boiler-room at a very small expense. The gasometer could be placed at any convenient position in the ship, and the burners are thence supplied precisely as the various burners in a dwelling-house are furnished from the main.

THE EVILS OF LEAD PIPES AND CISTERNS.—Dr. Crace Calvert stated at a recent meeting of the Manchester, England, Literary and Philosophical Society, that he had been engaged for the last few months in investigating the action of the Manchester Water-Works water on various kinds of leaden pipes, and that he was arriving at such results as would show the necessity for serious consideration on the part of the inhabitants of that city, with respect to the evils arising from the introduction of the water into their dwellings through leaden pipes. Being requested by the Chairman to give his opinion, Dr. Angus Smith said that he had never found any Manchester water which had passed through lead pipes to be entirely free from lead. At the same time, the quantity is in almost all cases so small that, as far as we know, it can produce no bad effects, and is practically equal to nothing. There is, however, a great difficulty in knowing what is hurtful; medical men had not settled the point. Persons said to be suffering from lead paralysis were known to have taken water with as little as one-hundredth of a grain of oxide of lead per gallon, whereas it was considered generally not to be hurtful until it contained one-fortieth of a grain. We have little idea of the extreme susceptibility of some persons, and it is better to avoid lead as much as possible. Short lead pipes may be used without fear in Manchester, especially if the water which has stood over night be thrown away. Long lead pipes should be avoided, and lead cisterns are extremely dangerous, especially with soft waters, including Manchester water. Soft water dissolves lead more readily than many hard waters, and if the hardness be due only to the earthy carbonates, the lead becomes coated instead of being dissolved. But if the hardness be due to chlorides or nitrates, the water dissolves lead much more rapidly than pure water. He gave an instance of water from a cesspool, obtaining, by oxidation of its impurities in a porous soil, much nitric acid, which, along with the chlorides always found in such cases, caused the adjacent water, when drawn up by a lead pump, to have a very strong taste of lead salts. It is remarkable that this water was drunk for some years, but ultimately caused the death of two or three persons. It is a mistake to suppose that pure water dissolves lead more than all impure waters. Some very pure natural waters dissolve lead simply because they contain chlorides, although in small quantities. Such waters sometimes come from clay slates and similar formations. As to peaty water, it was of two kinds, occasionally acid, with some action on lead, but in most cases alkaline, the peaty matter not dissolving lead. Some lead pipes were more easily affected than others. Dr. Smith gave an instance of a lead pipe, nearly an inch in thickness, with holes pierced through the sides in various places by the action of the water; others are much more equally corroded. He had spent a long time in obtaining a suitable coating for lead to protect the water from its action, and had not quite succeeded; but he had given his results to a friend, who had gone further, and, having obtained great success, patented the process. However, he was told that no one would buy lead pipes of the kind, as they cost half a crown per cwt. more than the ordinary ones. People complain of evils which they refuse to escape from. It is, however, better to avoid lead than to avoid pure water because of its action on lead.

JOLIET, ILLS.—Coal-gas works, built by P.P. Deily, Philadelphia—"first-rate works, no better." Iron retorts from Starr, gas-holder from Deily. Morris, Ills., coal is used, at $2 75 per 2,000 lbs. The works are considered a model in their way, the leakage and condensation is nothing, and they say the coal which they use "is considered by other gas-companies as good for nothing, but it yields from 3½ to 4 feet per lb., and makes gas equal to any works in the United States, with no offensive smell." They use a washer with cold spring water running constantly through the gas, dipping twelve times into the body, with a 180 feet condensing pipe laid underground in the rock, with spring water running over and round them. The new State prison is lit up by this company, with 1¾ miles 4 inch pipe; 1,200 cells are lighted by it, besides other buildings, shops, &c.

KITTANNING PA.—These are known as the Armstrong Gas-Works, as stated on page 224. From the numerous enquiries made at these rooms about the value of the stock of this company, it would seem to have been offered in swap for "pups" of every age and size. As the company are unable or unwilling to give any information about their affairs, anxious enquirers may as well leave the stock alone until further advised.

PATENTS.

Inventors are informed that Patents are procured at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, through F. C. TREADWELL, Jr., Esq., an experienced Patent Agent and Expert, in the United States, and in all other countries where Patent Laws are in force.

UNITED STATES.

RE-ISSUE.

48.—C. C. Lloyd, of Philadelphia, Pa., for an Improvement in Gas Meters. Patented June 20, 1854:

I claim the application and mode of operation described, when the double purpose is effected of equalizing and regulating the pressure of gas within the meter, and of shutting off the gas when the water gets too low, by combining the valve with one and the same float, all within the meter, substantially as and for the purpose set forth.

I also claim the float, K, in combination with any suitable inlet valve, when the said float operates in a chamber, L, so placed in the front of the meter as to be isolated from the inlet pressure, and the said chamber being so situated or so constructed that its interior may communicate with the inlet pressure at the point between the water line and the top of the outer opening of the drum, when the water gets too low, as set forth.

ADDITIONAL IMPROVEMENTS.

316.—G. J. Willson and D. H. Fox, of Reading, Pa., for an Improvement in Gas Meters:

We claim, first, the application and combination of the lower valve, c, and its seat, D, with our open discharge pipe, Q, and open filling tube, R.

Second, The application of a back outlet connection with one or more openings in back of meter at any convenient place, to prevent a direct connection to or with the measuring drum, or the applying of any instrument to pierce or injure the measuring drum of a wet gas meter, as set forth.

318.—S. B. H. Vance, of New York City, for an Improved Electrical Apparatus for Lighting Gas. Patented Feb. 5, 1861:

I claim the employment or use of the stationary electric machine, as described, in place of the lamp, candle, taper, or other match, generally used for lighting gas.

709.—E. J. Hale, of Foxcroft, Maine, for an Improvement in Lanterns:

I claim the the foraminous conical cap, r, made with its holes, in conical frusta, arranged so as to project from the other surface of the cap, as described, in combination with the coal oil lamp, its chimney, and the lantern case arranged together, substantially as described.

I also claim the application of the parts, o l, to and their arrangement with the chimney supporter, n, when separate from and supported by the deflector supporter, substantially as described.

710.—James Hale and J. S. Atterbury, of Pittsburgh, Pa., for an Improvement in Lanterns:

We claim (for use with a lantern and lamp, constructed substantially as described,) a lantern glass with an outer flange, I, blown or formed round its base, in combination with a horizontal extension or flange, F, of the burner cap, E, substantially as set forth.

716.—E. D. Kendall, of New York City, for an Improved Apparatus for Naphthalizing Gas:

I claim the combination of the reservoir, K, cylinders, B and D, or their equivalents, wick, h, and slide, E, the whole applied, substantially as described, in relation to each other, and to the inlet, a, from the supply or service pipe, and the outlet, b, to the burner or burners, substantially as and for the purpose specified.

718.—J. J. E. Lenoir, of Paris, France, for an Improved Air Engine:

I claim the arrangement in an air engine, substantially as described, of the parts for the admission to the cylinder successively of air and inflammable vapor or gas in such requisite quantities and proportions as that the former shall act upon the piston by expansion, on being heated by the ignition of the latter, as described, in combination with a device for igniting said vapor or gas by electricity at each end of the cylinder, essentially as set forth.

735.—James Reed, of Newville, Ohio, for an Improvement in Water Wheels:

I claim, first, A plano-convex spiral bucket for water wheels, as set forth and substantially as described.

Second, I claim a bucket for water wheels, of the character above stated, in combination with a circular chamber, for the purpose set forth and substantially as described.

739.—J. R. Robinson, of Boston, Mass., for an Improvement in Steam Boiler Furnaces:

I claim the construction and arrangement of the gas mixing chamber, D, directly over the fire chamber, with openings, e e, at the sides thereof, substantially as described.

And I farther claim, in combination with the so constructed and arranged gas-mixing chamber and its side openings, e e, the opening, g, at the crown of the arch, E, or its equivalent, communicating with the highest part of the fire chamber, and fitted with a valve or damper, h, substantially as and for the purpose specified.

744.—J. H. Simonds, of New York City, for an Improved Hot Air Register;

I claim having the open face plate, B, of a hot air or verti-duct register, of curved or arched form, so as to project outward from the duct, C, and former space or chamber, d, which, in connection with box, A, serves to admit of the operating of the slats or valves, without interfering with or obstructing the duct, as set forth.

[The object of this invention is to obtain a register which may be economically constructed, readily adjusted, and one that will not be liable to get out of repair or rendered inoperative by use.]

761.—A. M. Millochau, of New York City, assignor to Henry Levrat, for an Improvement in Methods of Extracting Oil from Fish:

I claim the described process substantially of obtaining oil directly from fish, by means of a bath of dilute sulphuric acid, and without forcible separation.

GAS EXPLOSION IN BOSTON.—While some laborers were digging a trench in Franklin street, at the junction of Hawley street, Boston, a few weeks since, a gas explosion took place in a somwhat singular manner. One of the men was drilling a hole with a crowbar, through a brick wall, a spark of fire communicated with the gas which had escaped, setting it on fire. Fortunately, the corner of the reservoir was easily thrown off, and the greater force of the explosion was in that direction. Mr. Carr had one of his wrists considerably burned, and his face slightly, while his hair and whiskers were singed. Another man, near the trench, was thrown backward into it, but was not much hurt. The corner of the reservoir was thrown upwards to a height of forty or fifty feet, and landed several rods away.

Things Ancient, Quaint and Rare.

THE COMMONWEALTH MERCURY,

From Thursday, September 2, to Thursday September 9, 1658.

FROM WHITEHALL, SEPT. 6.

It was reſolved, That Friday next be appointed for a day of Faſting and Humiliation, in ſence of the hand of God, in taking away the late Lord Protector, and to ſeek the Lord on behalf of his Highneſs the now Lord Protector, and to beg a bleſſing on him and his Government, and Mr. NYE, Mr. COOPER, Mr. HOOK, Mr. GRIFFITH, Dr. GOODWIN, and Mr. STERRY were deſired to carry on the work of the day.

ADVERTISEMENTS.

THere is newly Publiſhed, A few Sighs from Hell, or the Groans of a damned Soul, being an Expoſition of thoſe words in the Sixteenth of LUKE, concerning the Rich Man and the Beggar; wherein is diſcovered the lamentable ſtate of the damned, their cries, their deſires in their diſtreſſes, with the determination of God upon them: A good warning word to ſinners, both old and yong, to take into conſideration betimes, leſt they come into the same place of torment. Alſo a brief diſcourse touching the profitableneſs of the holy Scriptures. By that poor ſervant of Jeſus Christ, JOHN BUNYAN. Sold by M, WRIGHT at the King's-Head in the Old-Bailey.

THat excellent, and by all Phyſitians approved, China Drink, called by the Chineans, TCHA, by other nations, TAY or TEE, is ſold at the Sultaneſs-head, a COPHEE-HOUSE in SWEETINGS RENTS by the Royal Exchange, London.

AUgust 30, 1658, loſt from Mr. Butterfields graſs in ISLINGTON, one Bay Gelding with a ſhort tail, and a wenn on the near ſide, and a white ſpot on the near Buttock, about 14 or 15 hands high, aged 13 years, very ſmall headed and high mettled: Give notice to Quarter-Master EDW. LLOYD at the Globe at ISLINGTON, and forty ſhilling ſhall be thankfully payed as Reward.

WATER-GAS WORKS.

WATER-GAS.—APPLETON & GRAHAM,

AGENTS FOR THE

NEW ENGLAND WATER-GAS COMPANY,

UNDER THE SANDERS PATENT,

Are prepared to give estimates for Works, and guarantee the cost of Gas not to exceed One Dollar per 1000 cubic feet.

☞ Coal or Rosin Gas-Works altered at small expense.

A. & G. continue as heretofore to erect their improved Rosin and Rosin-Oil Works for Private Dwellings, Factories, &c. For further particulars apply at 56 WASHINGTON-ST., BOSTON

SITUATIONS WANTED.

WANTED.—A Situation by a person who has served five and a half years at gas fitting; has superintended gas-works for three years, having had control of two at one time. Can set Lamp Posts, Meters, Retorts, lay Mains, or do any other necessary work about a Gas-Works. Address

C. S., Box No. 228,
Lewisburg, Union Co., Pa.

A Practical Gas Fitter and Gas-Engineer desires a situation in a Northern gas-works. A stoker at present engaged with him would like to accompany him. The highest references will be given on addressing

P. F. T.,
Rooms of the AMERICAN GAS-LIGHT JOURNAL.

A Gas-Engineer at present engaged in a Western gas-works, desires a situation from the first of April, when his present arrangement will expire. Address, K. J., care of the Editor of the AMERICAN GAS-LIGHT JOURNAL, through whom his present office was obtained.

A First Class Gas-Engineer, who has filled one of the first positions as such in the United States, wishes an engagement in a Gas-Works.

Full particulars will be given on addressing M. F. H., Post-office, Philadelphia.

STOP-COCKS, &C.

DANIEL THOMPSON,

Machinist and manufacturer of Stop Cocks, Fire Plugs, &c., for Water-Works, STOP COCKS, VALVES, DEEP PUMPS, &c., for Gas-Works, No. 138, Fifroth Alley, Philadelphia.

SCIENTIFIC BOOKS.

GAS ENGINEERS' LIBRARY—A few works, indispensable to Engineers, Contractors and others engaged in the construction of Gas Works and manufacture of Gas, have been selected out of a large stock of chemical and other works, and are recommended to the attention of those interested. See page 208, vol. II, of this JOURNAL.

For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, New-York.

COAL OIL.—A Practical treatise on Coal, Petroleum, and other distilled Oils, by Abraham Gesner. 8vo., illustrated. Cloth, $1 50.

Sent free by mail on receipt of the amount.

BAILLIERE BROTHERS, 440 Broadway, N. Y.

BAILLIERE BROTHERS keep always on hand a complete assortment of all new books on Chemistry and the Sciences.

Catalogues sent gratis on application.

GAS LANTERNS.

A. & G. BRANDON, Manufacturers of Street and Fancy

LAMPS,

of every pattern, for Hotels, Saloons and Public Buildings, on hand and made order.

Cities, Villages, and Gas Companies supplied with Street Lamps, on favorable terms. Office, No. 4 TYRON ROW, City Hall Square, and Manufactory, No. 102 Mulberry street, one door from Canal street, New-York.

Cast Iron Street Lanterns, neat and very durable.

For sale by JOHN JEFFREY, Cincinnati, Ohio.

Street Lanterns cast in three pieces, which are fitted together without bolts, rivets, solder or other fastenings; glazed without tins, putty, or catches; the glass slipping into grooves cast in the lantern. These lanterns have been adopted, and are now used, by the City Councils of Cincinnati, O., Covington, Ky., and other cities.

GAS-METER FLUID.

FLUID for GAS METERS.—The undersigned is prepared to furnish the Glycerine meter fluid in quantities to suit purchasers: *it does not evaporate, can be made to stand any degree of cold liable to occur in this country or in Canada, and does not corrode the metals of the meter. It has been in use successfully for the last three years.*

For particulars, references, &c., address the manufacturer, HENRY BOWER,
Box 263, Philadelphia, Pa.

LIGHT-HOUSE BOARD.

OFFICIAL.—NOTICE TO MARINERS.—No. 104. Africa—Southeast Coast—Fixed White Light at mouth of Buffalo River.

TREASURY DEPARTMENT, Office of Light-House Board, Washington, Dec. 20, 1860.

Official information has been received at this Office that the Colonial Government at the Cape of Good Hope has given notice, that on and after the 25th day of August, 1860, a light would be exhibited from the light house recently erected at the entrance of Buffalo River, East London, Southeast coast of Southern Africa.

The light is a *fixed white* light, elevated 45 feet above the level of high water, and visible in clear weather from a distance of about 11 miles.

The light-house—painted in alternate bands of red and white—stands on the reef at the south side of the entrance of the river.

R. SEMMES, Secretary.

PATENT RIGHTS.

INVENTORS' DEPOT & SALES Room for Patent Rights.—Parties desirous of placing with us valuable Patents, for the sale of Rights, on commission, will here find the Head-Quarters for Inventors and their Patents, as well as for parties seeking investments in articles of undoubted merit. The public are invited to call, or send for Circulars. New articles coming in daily. BUTLER, HOSFORD & CO.,
No. 30 Broadway, N. Y., Proprietors of the Paragon Self-Generating Gas-Light.

MISCELLANEOUS.

WOODEN TRAYS FOR GAS-PURIFIERS.—JOHN L. CHEESMAN, No. 147 Avenue C, near Tenth street, New-York, manufactures his Patent WOODEN TRAYS for GAS-PURIFIERS, *cut out of the solid wood*, superior to the ordinary iron plates, cheaper and more durable. The attention of Gas Companies and Engineers is called to this improvement, which has been adopted by the following Gas-Works:

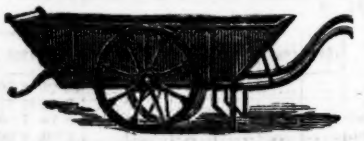
Albany, N. Y.,	Manhattan, N. Y. City,
Chicago, Ill.,	Philadelphia, Penn.,
Williamsb'gh, N.Y.,	Worcester, Mass.

See Engravings on page 148, Vol. II.

HARRIS LOUDERBACK,
FIRE-BRICK LAYER
AND GAS RETORT SETTER,
No. 1005 Clement St., Philadelphia.

MISCELLANEOUS.

McKINNY & KELLY,
MANUFACTURERS OF
COAL-SCOOPS & COKE-BARROWS



FURMAN-St., Near Fulton Ferry, Brooklyn, N. Y.

GAS THERMOMETERS FOR ascertaining and regulating the temperature of the gas while passing through the purifiers into the station meters. For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

A LAMP CHIMNEY that will not break! This invention possesses many advantages over the glass chimneys now used on Coal Oil Lamps. They do not break from the heat, falling, cleaning, or any ordinary usage.

THEY FIT ALL THE BURNERS NOW IN USE.

For particulars call or address the Patentees and Manufacturers,

HORNING & HUMPHREY,
No. 321 N. Second St.
Philadelphia.

BURTIS' PATENT COMPENSATING COUNTERBALANCE FOR GASOMETERS.—This Improvement consists in making the attachment to the Gas-Holder by counterweights in such a manner as to effectually prevent it from getting out of level so as to bind, and also to prevent any escape of Gas at Cup or Hydraulic seal, where the Holder is on the Telescopic plan. Holders that work out of level, are thus evenly balanced, and prevented from binding or lodging against Tank-wall and falling down, thereby being rendered unfit for service. Where Holders or sections of Holders cannot be used on account of the above difficulties, this arrangement will remove them, and place the Holder in good working order; moreover, with this attachment, deep tanks are not necessary.

BURTIS' COUNTERBALANCE has been in use for three years at the Gas-Works, Chicago, Ill. Its resistance to high winds and snow-drifts, is alone sufficient to recommend its general adoption. For Engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, page 221. Address P. T. BURTIS,
Engineer Gas-Works, Chicago, Ill.

GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE

FROM

JOSEPH CLIFF,

Wortley Fire-Brick Works, Leeds, Eng.

T. W. PARMELE, Agt.,

No. 4 Irving Place, N. Y.

STOURBRIDGE FIRE-CLAY WORKS.

E. BAKER & CO.,

SUPPLIERS OF

STOURBRIDGE FIRE-CLAY GOODS, &c.,

TO ALL HER BRITANNIC MAJESTY'S DOCKYARDS, &c.,

24 Wharf, Harrow Road, Paddington.

Mines and Manufactory—BRIERLEY HILL, STAFFORDSHIRE.

Fire-Clay Retorts, Glass-House Tiles, Cupola Bricks, Lumps, Cement, Crucible and best Pot Clays, &c., &c.

☞ Shippers supplied on liberal terms.

JOHN RUSSELL & CO.,

PATENT TUBE MAKERS,

THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE

69 UPPER THAMES-ST., & 5 CHARLES-ST., SOHO, LONDON;

AND 35 GRANBY-ROW, MANCHESTER, ENGLAND.

The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lapwelded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water. Galvanized and Composition Tubes. Chandeliers, and every kind of Brass-work or Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST IRON PIPE AND GAS-METERS.

ALL GOODS WARRANTED.

GENGEMBRE'S PATENT NON-FREEZING AND NON-EVAPORATING GAS-METER FLUID.

By the use of this Fluid, the WET GAS-METER of ordinary construction is rendered the most perfect and most reliable Gas-Measuring Instrument ever offered to Gas Companies. In winter the Meter will continue to work equally well, *however exposed it may be*; and in summer, the level of the Fluid remaining constant without refilling, the measurement of the Gas will be both uniform and constant.

The use of this Fluid is both easy and economical, and Gas Companies desirous of using it, will be licensed on liberal terms. For further particulars, and certificates of parties having used the same or over three years, and for city rights, apply to

A. DOISY, Box 1180,

General Agent and Attorney for GENGEMBRE'S PATENT.

N. B.—No Sales of Territorial right, or Licenses for using my Patent will be valid, without being ratified by my Signature, as I have no Agent authorized to execute the same.

H. P. GENGEMBRE, PATENTEE, Box 48, Alleghany City, Penn.

THE

STERLING GAS-REGULATOR

Improves the Light, and Saves a Large per centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING-MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light. In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New-York Times, New-York Herald, New-York World, New-York Tribune, New-York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zeitung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

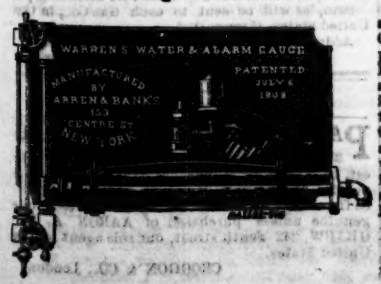
WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW-YORK

To keep in order, and always maintain the pressure of the Gas at the lowest point for a brilliant light, and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meter, or in any way injure them.*

WARREN'S PATENT WATER AND ALARM GAUGE.

For Protecting the Flues and Preventing Steam-Boiler Explosions.



This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight, the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low Water Detector. For sale by

WARREN & BANKS,

153 Centre St., Corner of Canal St., New York,

Where a gauge is constantly in operation.

F. BUTTS & CO.,

(Successors to BUTTS & KENDALL,)

DEALERS IN THE CELEBRATED

STERLING COAL,

PITTSBURGH AND OTHER GAS-COALS,

Cleveland, Ohio.

We beg to call the attention of Gas-Light Companies to the following; from which, (and others,) and the universal expression of Gas Men, as to the superior quality of

STERLING COAL,

we believe that it is the BEST COAL IN THE COUNTRY.

From the Manhattan Gas-Light Co., New York.

Gentlemen—Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9620 cubic feet of 15 candle Gas per ton of 2240 lbs., and 41 bushels of Coke weighing 1465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke.

I am, Gentlemen, Your Obedient Servant,

CHARLES ROOME, *President.*

From the Rondout and Kingston, N. Y., Gas-Light Company.

Gentlemen—The 600 tons of Coal ordered from you in August, 1859, has now been in use over four months, to my entire satisfaction.

Its average yield is 4 40-100 feet, and a good strong light. The Coke produced equal, both in quality and quantity, to best English Coking Coals. It burns very freely, with little clinker. In purification it is economical, using no more lime than New Pelton. It is superior to any American Coal I ever used. I shall be pleased to give you any further information at my office in New York.

WM. W. HAGUE, 552 Broadway.

From the Sandusky, O., Gas Co.

Gent'emen—This Company has used your Sterling Coal since July 3d, 1856, and are still continuing the use of it with satisfaction to the Company and consumers. The average product has been 8,620 feet of Gas per ton of 2,000 lbs., and 37 bushels of Coke of very superior quality. The Gas is as good as that obtained from Pittsburgh Coal. I consider it the best Coal ever used in our works.

I am, Gentlemen, Yours Respectfully,

WILLIAM HUDSON, Sup't and Sec'y.

From the Toledo, O., Gas Light Co.

Gents:—Your favor of the 18th inst. to hand and noted.

The Sterling Coal received from Messrs. Butts & Co., the last Summer and Fall, fully sustains the character it has as a Gas Coal, from previous use in our works. We think the quality of Gas is very good, a little better than that produced from the Coal had of them the year previous—yielding 8,666 feet per ton of 2,000 lbs., and 36 bushels of Coke, of very good quality, well adapted to our use.

Respectfully Yours,

GEO. SPENCER, President.

From the Buffalo, N. Y., Gas-Light Co.

MESSRS. F. BUTTS, & Co.—The Sterling Coal we have had from you we find to be an excellent Gas Coal. The yield of both Gas and Coke is good. The illuminating power of the Gas is high and the quality of the Coke is very good.

OBERT ROBSON, Foreman Gas-Works.

From the Cleveland, O., Gas-Light & Coke Co.

Gentlemen—This Company has used between 3,000 and 4,000 tons of your "Sterling Coal," and are still using it with satisfactory results. We find the average product of a ton of 2,000 lbs. is about 8,800 feet of Gas, and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9,000 feet, and the Coke of very superior quality.

The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke is better adapted to our use.

Yours Truly,

T. DWIGHT EELLS, Secretary.

From the Albany, N. Y., Gas-Light Company.

MESSRS. F. BUTTS & CO.:—*Gentlemen*—We have been using your "Sterling Coal" at these works for two years, finding it all that is important in Gas-making Coal, as respects yield and quality of Gas, and freedom from Sulphur—as much so as any of the Coking Coal now in use. We are disposed to contract for a further supply of the same quality. Very Respectfully,

PAUL A. SABBATON, Sup't.

From the Troy, N. Y., Gas-Light Co.

MESSRS. F. BUTTS & CO.:—*Gentlemen*—The Coal we have used the past year at our works has been mostly "Sterling." It has given us full satisfaction in every respect. S. S. DAUCHY, Sup't.

The following analysis of Sterling Coal was made by Prof. J. LANG CASSELS, Professor in the Cleveland, O., Medical College, who stands at the head of his profession as a Chemist, and any statement made by him can be relied upon with safety.

Sp. gr.	1,283	
Hygrometric Moisture		1.85
Volatile Combustible Matters		34.15
Coke, (clear and porous,)		64.00
		100.00
Fixed Carbon in the Coke	62.00	
Ashes, (yellowish white,)	2.00	
	64.00	
COMPOSITION OF ASHES.		
Silex,		0.80
Alumini,		0.45
Sulphate of Iron,		0.75
		2.00
Per centage of Sulphur,		0.2

J. L. CASSELS, M. D.,
Prof. of Chemistry, Clev. Med. Col.

P. S.—The specimen from which the above analysis was made, was taken by myself from a car load, and may be regarded as a fair average; in fact this Coal is very uniform in its characteristics. It also yielded 4 per cent. more gas than the Pittsburgh Coal. J. L. C.

We would also refer to Gas-Light Companies in the following places:

NEW YORK CITY, (Manhattan and New York Co.'s,) BROOKLYN, ALBANY, TROY, WEST TROY, ROCHESTER, OSWEGO, RONDOUT, KINGSTON, ALBION, BROCKPORT, SENECA FALLS, ELMIRA and LYONS, in the State of New York; CLEVELAND, TOLEDO, SANDUSKY, NORWALK and OBERLIN, in Ohio; DETROIT, ANN ARBOR, GRAND RAPIDS and KALAMAZOO, in Michigan; COBURG, in Canada; CHICAGO, Ill., and two Companies in MILWAUKIE, Wisconsin.

The extensive Mines in Pennsylvania, known as the Sterling Hills, (which are the highest in that part of the State,) are wholly under our control, and the Coal is mined and sold only by us or our agents. As the Coal has improved the further we have got in, and being several hundred yards further in than last season, with about a hundred feet more earth over it, *the quality of Coal we mine this year will be better than ever.* Some Coals are good in one or two particulars, and defective in others; but in combining all the qualities desired in a Gas-Coal, we know of none equal to the STERLING. Getting it to this place by Rail-road, a supply can be had during the Summer months, (as well as at all other times,) which is not the case with Coals dependent upon high water for transportation, as are those shipped from Erie, Pa. Having increased our mining facilities, we are prepared to ship on a more extensive scale than heretofore, and should be pleased to receive your orders.

☞ Having discovered that certain unprincipled Coal Dealers are endeavoring to sell an inferior article of Coal, under the name of STERLING, we deem it our duty, as well for your interest as for ours, to notify you, that you may be on your guard in purchasing what you might think was STERLING. *There is but one Sterling Coal Mine, and that Mine we have the full and entire control of;* and Gas-Light Companies can obtain the GENUINE STERLING COAL only by ordering direct from us, or F. WELLINGTON, Syracuse, N. Y., who is our only agent for that State.

F. BUTTS & CO.

CLEVELAND, O., March 1st, 1861.

COAL-OIL & CANDLES.

CANDLES FROM COAL.—Manufactured by the New York Paraffine Candle Co. Under Meucci's Patent. The above Company having recently made great improvement in their mode of manufacture, now offer to the public a Candle superior to any other in the market. They give a softer and more brilliant light and burn 6 hours to the pound longer than the best wax and sperm, and considering the strength of the light, are the most economical Candles in use.

CAUTION.

As unscrupulous persons are already offering imitations of these Candles, purchasers should bear in mind, that every box sold by this Company is stamped with the annexed trade mark, to counterfeit which is felony.

For sale by all first-class grocers, and to the trade by WM. E. RIDER,
General Agent of the Company,
16 Beekman Street, New York.

STANDARD Photometric Candles.—Owing to a number of Applications made to me for information concerning the supply of the "Standard Sperm Candles," used in Photometries, I have obtained a supply, from which I can furnish those who require them with full directions for use. T. W. PARMELE,
No. 4 Irving Place, New York.

TO CANDLE AND SOAP Makers.—Processes with drawings to manufacture every kind of candles and soaps by different processes: Candles by distillation, saponification, French candles, common candles, hard and soft soaps, palm soaps; processes to bleach palm oil and make candles out of it; purification of tallow; essays on greases and soaps. Address, Professor H. DUSSAUCE, Chemist, New Lebanon, N. Y.

J. L. McREA, Dealer in Coal Oils and Lamps, Binnacle and Signal Light Oils, 139 Water street, New York.

Rosin Oil and Rosin.—For sale of our own manufacture a superior article of ROSIN OIL, for Gas purposes. Also Refined Oil. For shipment in secure iron-bound barrels, or by any single barrel.

Address MARYLAND GAS COMPANY, No. 6 Bank of Baltimore Building, Baltimore, Md.

P. S. This Company is also prepared to construct their superior Patented GAS WORKS of any capacity, from that required for a private dwelling, hotel, church, college or factory, to such as will supply cities and towns, complete in all their parts for the manufacture of GAS, from either Rosin Oil, Coal, or Rosin.

THE LUTHER ATWOOD OIL CO.—Manufacturers of Superior Illuminating, Machinery and Binacle Oils. Office, No. 34 Burling Slip, New York.

EMPIRE CITY CAMPHENE Works.—Aaron Seeley, Manufacturer and Distiller of camphene, alcohol, burning fluid, coal-oil, and dealer in naval stores, of every description. 32 and 34 Burling Slip, New York.

H. RYDER & CO., New Bedford, Mass.—Purchasers and Manufacturers of Semi-Crude Paraffine. Ryder's patent Paraffine Candles, manufactured and for sale.

NEW-BEDFORD OIL CO.—Office foot of South-st., New-Bedford, manufacture coal-oil for illuminating and lubricating purposes, of the best quality.
ABRAHAM H. HOWLAND.
Our Coal Oil will burn in all Kerosene Lamps.

UNION WIRE-WORKS.

ROBERT McMURRAY & CO., Manufacturers of Copper, Brass, and Iron Wire Cloth for Gas-Works, all kinds of Foundry Riddles, Sieves, and Screens, No. 29 Fulton street, New York. Improved Wire Window Shades, Wire Bolting Cloth, Duster-Wire, Wire Cloth for tanning-machines, Rosin, &c., Locomotive Wire, Fire Guards, Ornamental Wire Work of every description. Patent Improved Wove and Laid Dandy-Rolls made, repaired and designed to order.

OLEOMETERS.

OLEOMETER, OR HYDROMETER. For Kerosene, Coal Oils, Petroleum and other Distilled Oils. Scale by Dr. Gesner. Manufactured and sold by
C. TAULIABUE,
296 Pearl-st., New York.

PORTABLE GAS-WORKS.

THE AUBIN GAS-WORKS CO., No. 44 State street, Albany, N. Y., will refer parties wanting GAS-WORKS FOR VILLAGES to seventeen of their Village Works now in operation in the United States and the Canadas in *every one of which the profits of the company are ten per cent. and upwards, and yet good gas is furnished.* Agents wanted to extend the sale of the AUBIN PORTABLE GAS STOVES for dwellings, factories, &c., which will make 1000 feet of gas in five hours, and with greater simplicity, safety and economy, than any other known apparatus.

BUTLER'S PATENT PORTABLE ROSIN GAS-WORKS,
FOR
DWELLINGS, CHURCHES, COUNTRY VILLAGES
AS WELL AS FOR CONSUMERS IN LARGE CITIES.
JOHN BUTLER,
No. 112 Fulton-st. and 15 Henry-st.,
Brooklyn, N. Y.

FOR LIGHTING RAILROAD CARS AND STEAMBOATS WITH GAS.
The whole process of Filling the Gas-Holders of a Railway Train, requires but Three Minutes.
APPLY TO THE
NEW YORK CAR & STEAMBOAT GAS CO.,
No. 117 Fulton-st., N. Y.

C. R. WOODWORTH, Manufacturer of
PORTABLE GAS-WORKS,
74 WALL STREET, New York City

PORTABLE GAS WORKS.—S. T. McDOUGALL'S PATENT Portable Gas Works, for making Gas from Rosin, Rosin Oil, Coal Oil, Naptha, Grease, etc. These Works combine the latest improvements in gas making, and are guaranteed to be superior to any in market. They are made of all sizes, suitable for either country or city use. No county house is complete without its Gas Works. Gas Stoves of every description on hand and made to order. For sale by S. T. McDougall, 170 Center Street, New York.
Agents wanted in other cities to sell rights or machines.

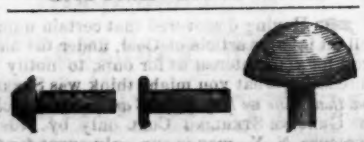
GAS FOR THE COUNTRY.—C. WOOSTER, Manufacturer of Improved Portable Gas-Machines, for Villages, Public Institutions, Churches, Hotels, Railroad Depots, Factories, Mills, Machine-Shops, Plantation Dwellings, &c. Office, 256 Canal street, near Broadway.
This Machine has been in successful operation for years, in many of the best residences and factories in the country, and for simplicity of construction, ease of management and economy of light produced, possess advantages over all other machines for the purpose now in use. It is adapted to the making of Gas from Crude Rosin or Rosin-Oil, producing a Gas of twice the illuminating power of Coal-Gas, at about one half the price usually charged for that gas.
Every Machine is sold under a strict guarantee to operate according to representation, and no payment required until the fact is demonstrated by actual use.
For further particulars, and descriptive pamphlet containing references to numerous parties now using the apparatus, address
C. WOOSTER,
No. 256 Canal-st., near Broadway, N. Y.
For Engravings, see AMERICAN GAS-LIGHT JOURNAL, for June, 1860, page 245.
☞ Responsible Agents wanted, with whom liberal arrangements will be made.

APPLETON'S IMPROVED GAS-Works, for Factories, Hotels, Dwellings, and Towns. The most simple and economical works in use, furnishing a superior light to coal gas at a cost of one half a cent per burner per hour. It does not injure trees, or plate, and is not affected by cold. For Circular and Terms apply to APPLETON & GRAHAM,
56 Washington street, Boston.
For Engravings, see AMERICAN GAS-LIGHT JOURNAL for April, 1860, page 213.

ROSIN GAS-WORKS, for Factories, Hotels, and Public Buildings. These works may be seen in operation at the Berkshire Woolen Mills, Great Barrington, Mass.; Manchester Mills, Manchester, Ct.; A. A. Van Alen & Co's. Factories, Stuyvesant Falls, N. Y., and many other places JAMES O. MORSE & CO.,
76 John-st., New York.

MARSH'S PATENT ROSIN or Sun-Light Gas-Works, for Private Dwellings, Hotels, Factories, Railway stations, Sugar-Houses, Towns, &c. By the peculiar construction of the Retorts, the largest amount of decomposing surface is obtained in the smallest space. 2d. Gas is manufactured from crude rosin, without the least deposit of carbonaceous matter in the retorts or pipes: thus enabling them to be operated continuously, generating rapidly the best and cheapest illuminating gas obtained from this material. ALFRED MARSH & CO.,
241 Broadway, New York.

GASOMETER RIVETS.



PHILLIPS & ALLEN, Pennsylvania avenue, above 22d street, Philadelphia.—GASOMETER RIVETS of all kinds.

CROTON WATER ARREARS.

CITY OF NEW YORK, Department of Finance, Bureau of Arrears, Feb. 21, 1861.—Redemption of Lands and Tenements Sold for Taxes and Regular Rents of Croton Water.—Public notice is hereby given to the owners, mortgagees and lessees and persons otherwise interested in the lands and tenements sold in the year 1859 for the taxes of the years 1852, 1853 and 1854, and the regular rents of the years 1852 and 1853, that a detailed statement of such lands and tenements as have not been redeemed from the said sale is published in the *Evening Post*, a daily newspaper, printed and published in the City of New York. Such statement describes the lands and tenements sold and not redeemed, the amount and the term of years for which they were respectively sold, when the time for the redemption thereof will expire, &c., &c.
JOSEPH C. PINCKNEY, Clerk of Arrears.

IRON RETORTS.

CELLULAR GAS-RETORTS. C. M. CRESSON'S CELLULAR GAS Retorts, Patented October 3d, 1854. Adapted to the manufacture of GAS from Rosin, Coal, Wood, &c., and now in use at the Philadelphia Gas Works. Patent Rights for sale. For information apply to HENRY S. HAGERT, Attorney for Patentee, S. E. cor. of Walnut and Sixth streets, Philadelphia, Pa.

FOR SYMMES' PATENT RE-torts, Mouthpieces, &c. address—
ELLIMAN BROTHERS, 217 Pearl-st., New York.
MORRIS, TASKER & CO, Philadelphia.
Or H. K. SYMMES, Newton, Mass.
See Engravings in AMERICAN GAS-LIGHT JOURNAL for July 1, 1860, page 280.

MISCELLANEOUS.

MESSRS. J. WRIGHT & CO., CONSULTING ENGINEERS and SOLICITORS of PATENTS, No. 42 Bridge street, Blackfriars, London, E. C. Patents for inventions obtained in all countries where Patent Laws are in force.

PHOTOMETER APPARATUS and Room for Sale.—The Room is about 6 feet wide by 12 feet long, painted black inside and screwed together. It can be taken down and boxed for transportation. All the pipes and fittings are complete for immediate use. Address PHOTOMETER, care of the AMERICAN GAS-LIGHT JOURNAL, 254 Canal Street, New York.

GAS & WATER-PIPE.

W. & J. GRIFFITHS & CO.—City Tube Works, Malleable Iron, and Brass Foundry, No. 27 North Seventh Street, Philadelphia. Manufacturers of Wrought Iron Pipe, Lap Welded Flues and Fittings: also, Brass Work of all descriptions, for gas, steam and water. Particular attention given to heating buildings, &c.

PARIS'S PATENT
GLASS-ENAMELLED WROUGHT IRON TUBES.
PROSSER'S PATENT
LAP-WELDED IRON BOILER TUBES.
TUBES FOR ARTESIAN WELLS, CONVEYING STEAM OR WATER, SHAFTING, &C., SCREWED OR COUPLED TOGETHER, IN VARIOUS WAYS.
THOS. PROSSER & SON, 28 Platt-st. N. Y.

CAST AND WROUGHT IRON Pipe, Branches, Elbows, Sleeves, &c. Lamp-posts, Wrought iron Lanterns for Lamp-posts, Gas Retorts (clay or iron), Street Mains in 9 or 12 feet lengths. Sheet iron cut to pattern for Gas-holders. For sale by the manufacturers' Agent,
HENRY G. NICHOLS, 24 Pine-st N. Y.

HUNTER, KELLER & CO., Manufacturers of
WROUGHT-IRON PIPES, AND FIXTURES
of all descriptions, for
STEAM, WATER AND GAS,
144 Centre street, New York.

GIRARD TUBE WORKS. Murphy & Allison, Proprietors. Wrought Iron Coke-Welded Tubes, for Gas, Water, Steam, &c. Wrought, Cast and Malleable Iron Fittings, Steam and Gas Cocks, Valves. Also, Galvanized Tubes and Fittings.
Office 1908 Market street, Philadelphia.

AMERICAN TUBE WORKS.—W. G. Smith & Co., Forty-sixth street, east of 10th Avenue, New York City. Manufacturers of WELDED IRON PIPE for Steam or Gas, of all sizes, from 1-8th to 3 inches.

JOSEPH NASON & CO., 61 BEEKMAN STREET, corner of Gold street, New York, Manufacturers of Wrought and Cast Iron Pipes, and every description of Steam and Gas Fittings, used by Engineers, Manufacturers, and Gas Fitters.

Boiler Flues,	Back Pressure Valves,
Steam Boilers,	Steam Traps,
Boiler Pumps,	Steam Whistles,
Steam Pumps,	Gauge Cocks,
Steam Gauges,	Gas Cocks,
Safety Valves,	Gas Meters,
Stop Valves,	Fitters' Tools,
Check Valves,	Proving Pumps,
Governor Valves,	Screwing Machines.

JOSEPH NASON,
HENRY R. WORTHINGTON.

PLUMBERS & GAS-FITTERS.

LOCKE & CRAIGIE, Plumbers and Gas-Fitters, No. 12 East 20th street, New York.

LOCKE, CRAIGIE & CO., Gas-Fittings, Chandeliers, Brackets, Globes, &c., No. 927 Broadway, New York.
☞ Particular attention paid to country work.

JAMES HELME, Chandelier and Gas-Fitting Establishment, No. 58, East Thirteenth street, between Broadway and University Place, New York.

JOHN W. FARMER,
PLUMBER AND GAS-FITTER,
No. 248 BROOME STREET,
NEW-YORK.

BRADBURY M. JOHNSON, GAS-Fitter and Plumber, No. 111 East Eighteenth street, New York:
A large and elegant assortment of CHANDELIERS, BRACKETS, &c. Gas-Pipe and Posts made for Gas Companies on favorable terms.

M'KENZIE & O'HARA, Plumbers and Gas-Fitters, No. 326 FOURTH STREET, CORNER OF MERCER ST., NEW YORK.
Water Closet Pans, Wine Basins, Wash Basins, Sinks, Fountains, Jets for public and private purposes, Stop-cocks, Filters, and all other Water apparatus.
ALSO, a complete assortment of Gas-fixtures Pendants, Chandeliers, Brackets, &c. &c.

HEATING APPARATUS.

JOSEPH NASON & CO., Constructors of apparatus for warming Public and Private Buildings by Steam and Hot Water.
Improved Fans for ventilating Hospitals and other public buildings.
JOSEPH NASON,
HENRY R. WORTHINGTON.
No. 61 Beekman street, corner of Gold street, New York.

STEAM DOMESTICATED.—Low Pressure Steam for Domestic Warming, an Apparatus which is simple, durable, economical, and perfectly safe. Estimates given and work done in any part of the country.
Descriptive pamphlets furnished on application to BAKER, SMITH & CO.,
Sole manufacturers, Nos. 180 and 182 Centre street, N. Y.

GEORGE L. CANNON, Successor to the Rippowam Co., 54 East 13th street, between Broadway and University Place manufacturer and dealer in Air, Water, and Steam Warming and Ventilating Apparatus, Cooking Ranges, Range Furniture, Registers, Ventilators, &c.
Particular attention given to Heating Churches, School Houses, Public Buildings, &c.

HOT WATER GAS-STOVES, Manufactured by HUNTER, KELLER & Co., 144 Centre-st., New York.
See Engravings on page 163, Vol. II., of this JOURNAL.

GAS-BURNERS.

T. G. ARNOLD, Manufacturer of Gas Burners, Mercury Cups, Portable Sockets, Burner Pillars, &c., No. 447 Broome street (second door west of Broadway), New-York. Imported Scotch Tips and Burner Flyers always on hand

ORNE'S PATENT FILTER-REGULATING GAS BURNER, admitted by all practical and scientific men, who have examined its movements, to be
THE BEST GAS BURNER YET INVENTED.
They are self-regulating, gas-purifying, indestructible, and most economical.
For sale by S. A. STETSON & CO.,
350 Washington-st., Boston.

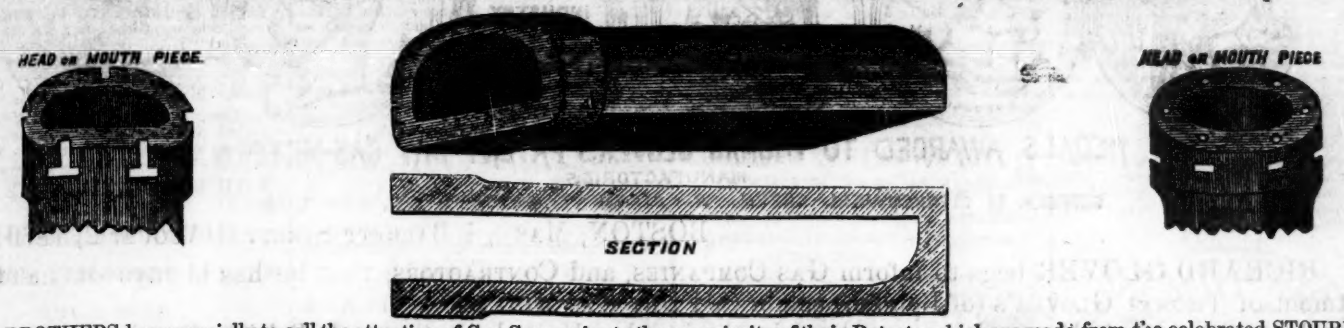
PERFECTION.—This recent Improvement in Gas-Burners, embraces the great economy of the Hicks Patent Burner, a gain of over 75 per cent. in light. This Burner is now offered to the Trade and all consumers of gas, at the price of the common burner. It is anti-corrosive, gives a uniform and beautifully-shaped blaze, under any pressure, and will not get out of order.
It has been adopted by the Manhattan and Brooklyn, N. Y., Gas-Light Cos., for street lamps.
Samples will be sent to each Gas Co., in the United States, if requested.
Address L. R. HICKS,
335 Broadway, New York.

ROOFING.

PATENT ASPHALTE ROOFING and SHIP SHEATHING FELTS, the cheapest, best, and most durable ever offered to the public. Circulars, samples, &c., will be forwarded free. Agents wanted for city and towns. None genuine unless purchased of AARON A. DEGRAUW, 242 South street, our sole agent for the United States.
CROGGON & CO., London.

KING BROTHERS,

STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning thus rendering them

FREE FROM CRACKS AND CORRECT IN FORM.

By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABBITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

HARRIS & PEARSON,

PROPRIETORS OF

BEST GLASS-HOUSE POT, AND CRUCIBLE CLAY.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

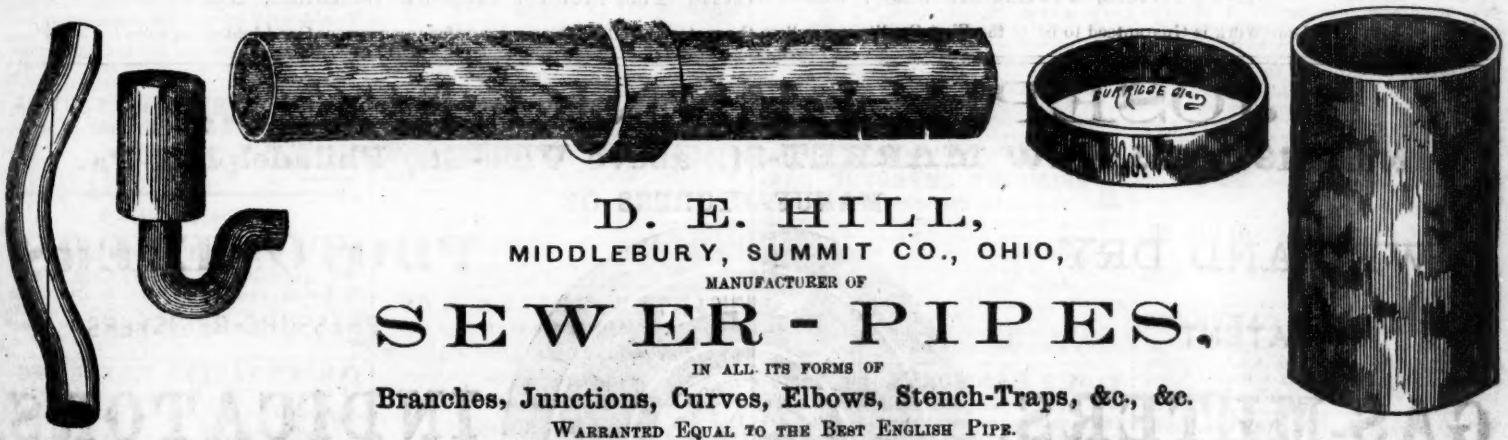
CODE, HOPPER & GRATZ,

1500, 1502 and 1504 FILBERT-St., PHILADELPHIA.

MANUFACTURERS OF

Pressure Registers, Pressure Indicators, Pressure Gauges, Photometers, Governors, Station Meters, Customer Meters, (Wet and Dry,) Experimental Meters, (Wet and Dry,) Show Meters, (Wet and Dry,) Meter Provers, Centre Seals, &c.

The high reputation which we have enjoyed for more than twenty-two years, and the fact that we have manufactured a greater number of Gas-Meters than all other manufacturers in this country combined must present itself as a security to parties desirous of securing the most reliable instruments. Having completed a most extensive addition to our Factory, and added many important improvements to our machinery, we are enabled to fill orders entrusted to us with dispatch, and in all cases *Guarantee Entire satisfaction.* Our Patent Rotary-Valve Dry Gas-Meter is now used by upwards of Two Hundred Gas Companies, giving general satisfaction; we therefore recommend it, believing itsuperior to any other Dry Gas-Meter manufactured. All Meters tested separately by a sworn Meter-Inspector, and sealed when desired.



D. E. HILL,

MIDDLEBURY, SUMMIT CO., OHIO,

MANUFACTURER OF

SEWER-PIPES.

IN ALL ITS FORMS OF

Branches, Junctions, Curves, Elbows, Stench-Traps, &c., &c.

WARRANTED EQUAL TO THE BEST ENGLISH PIPE.

EDWARD COCKEY & SONS'

PATENT GAS-VALVES.

These Valves are formed of two Cast-Iron Cylinders, with segmental divisions, having the faces ground gas-tight—the upper Cylinder turning horizontally on the lower one. The lower Cylinder has pipes from each division, communicating with the vessels to and from which the gas is to be passed. The upper Cylinder has corresponding divisions, so arranged as to direct the passage of gas to the different segmental divisions in the lower part, and when it is turned on the face of the lower one, to alter the flow of gas from one vessel to another.

Each valve has an index-plate provided, which is to be attached to the floor, and a pointer on the cover of the Valve shows which way it is turned. Thus, the Manager of the Works can at once see in which direction the gas is passing.

There are about fifty of these Valves now in use, of sizes varying from two to twelve inches, and they are giving great satisfaction. Amongst the Works at which they are fixed, the following may be mentioned:—

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